

# THE MEDICAL JOURNAL OF AUSTRALIA

VOL. I.—31ST YEAR.

SYDNEY, SATURDAY, MARCH 18, 1944.

No. 12.

## Table of Contents.

[The Whole of the Literary Matter in THE MEDICAL JOURNAL OF AUSTRALIA is Copyright.]

<b>ORIGINAL ARTICLES—</b>	Page.	<b>ABSTRACTS FROM MEDICAL LITERATURE—</b>	Page.
Health and the Gold Standard, by John Dale .. .	237	Medicine .. .	254
The Management of Established Wound Infections, by Hugh R. G. Poate .. .	242	<b>NAVAL, MILITARY AND AIR FORCE—</b>	
Kationic Chemotherapy, with Special Reference to the Acridines, by Adrien Albert, Ph.D. Medicine, B.Sc. .. .	245	Clinical Meeting at an Australian General Hospital	256
<b>REPORTS OF CASES—</b>		Appointments .. .	258
A Case of Pneumonia in Late Pregnancy, by Geoffrey Hall, M.B., B.S. .. .	249	<b>CORRESPONDENCE—</b>	
<b>REVIEWS—</b>		A Note on the Blood Sedimentation Test .. .	259
Surgical Treatment .. .	250	An Unusual Perforation of the Bowel in an Elderly Patient .. .	259
<b>NOTES ON BOOKS, CURRENT JOURNALS AND NEW APPLIANCES—</b>		The Sir John Ramsay Memorial Library .. .	259
Training for Childbirth .. .	250	<b>MEDICAL PRIZES—</b>	
<b>LEADING ARTICLES—</b>		The Stawell Prize .. .	259
Medicine and Engineering .. .	251	<b>NOMINATIONS AND ELECTIONS</b> .. .	260
<b>CURRENT COMMENT—</b>		<b>OBITUARY—</b>	
Elliptocytosis Associated with Hereditary Hæmorrhagic Telangiectasia .. .	252	Henry Maudsley .. .	260
An Experiment in the Control of Tuberculosis .. .	253	<b>BOOKS RECEIVED</b> .. .	260
The Half-Yearly Index .. .	253	<b>DIARY FOR THE MONTH</b> .. .	260
		<b>MEDICAL APPOINTMENTS: IMPORTANT NOTICE</b> .. .	260
		<b>EDITORIAL NOTICES</b> .. .	260

### HEALTH AND THE GOLD STANDARD.<sup>1</sup>

By JOHN DALE,  
Melbourne.

THE acceptance of a lecture on a subject such as this is evidence of the increasing interest of the medical profession generally in the nature of health, its preservation and improvement. We realize today that our profession cannot possibly accept the whole responsibility for the health or well-being of the community. What we can actually do is of great value; but it is of minor importance in comparison with activities in spheres such as those of economics and education. We must, nevertheless, interest ourselves in, and equip ourselves as far as possible to give advice upon, the whole scope of health.

The necessary limitation of our direct responsibilities in relation to health is such that I find myself objecting even to the title "health department". It would, perhaps, be wiser to have, in the government, a department and a minister of medical services, rather than of health. So, also, we should object to the use of the word "health" in connexion with the curriculum in schools, and to the idea of "doing health" on Tuesday afternoon from 3 to 3.30. When children study domestic science or physiology or do physical exercises, let those activities be called by their own names. All school activities should serve the health of the children.

A good definition of health is that it is "the quality of life"; and it is possible to classify the factors which affect that quality under such headings as diet, air, light, exercise and rest, social relationships, poisons and parasites. Consideration of these subject matters inevitably leads one on to economics, which in turn leads

to money, which may be called the life-blood of the industrialized communities of today. Money, again, brings one to gold and the gold standard.

The study of health brings one to gold by another route—namely, the consideration of poisons, so important among which in Australia is quartz dust, that terrible hazard of gold mining which has been responsible for the untimely death and crippling of so many Australian men in the prime of life, more perhaps than has any other single cause. The death rate from tuberculosis in Bendigo is still almost double that in Melbourne (see Table I).

TABLE I.  
Death Rates from Pulmonary Tuberculosis per 10,000 of Population.

Period.	Greater Melbourne.	Bendigo.
1891-1900 ..	16.7	24.1
1901-1905 ..	13.9	22.7
1906-1910 ..	10.8	21.2
1911-1915 ..	9.1	16.5
1916-1920 ..	8.3	16.0
1921-1925 ..	6.9	11.9
1926-1930 ..	5.9	10.7
1931-1935 ..	4.8	10.5
1936-1940 ..	4.7	10.5

Damage to health through gold mining is familiar ground to our profession and very properly within our sphere. The idea of damage to health by the use of gold as a standard of the value of money is not so familiar and may seem fantastic. The problems of control, standardization and stabilization of money, though seldom a matter of general discussion, and still largely veiled in secrecy by those who deal with these subjects, are, however, of urgent concern to all good citizens and particularly to members of our profession.

<sup>1</sup> Read at a meeting of the Victorian Branch of the British Medical Association in November, 1943.

It is proposed in what follows to discuss briefly the nature and functions of money, the origin and evolution of money and of banking, the relation of gold to money throughout that evolution, the problem of value and of the need for a standard of value, the gold standard and its abandonment and the problem of power and its exercise through money; and finally, to indicate the danger of a return to the gold standard and the necessity that the money supplies of the community should be regulated on a realistic basis by a public authority in the public interest.

#### The Forms and Functions of Money.

Money has varied physical forms, the most familiar being notes and coins which carry numbers and denominations, the latter varying according to the country concerned—pounds, shillings, pence, marks, *Phennige*, dollars, cents, *yen et cetera*. These coins and notes, the official money or legal tender of a country, are coined or printed by or on behalf of the government, which generally speaking has the sole right of issue. Money also takes the very important form of bank credit recorded as figures in the ledgers of banks and operated by cheques.

Everyone is familiar with the reasonable statement that money is a means of exchange. A man exchanges his labour or some possession for money, and exchanges this in turn for what he needs or desires.

A useful definition of money is "a valid demand for goods and services". It does not matter what form money takes, provided it is convenient and valid—that is, acceptable—and related to this definition is the statement that money is a ticket system, which is useful, since it is now literally true and serves to "debunk" the sacrosanctity and mystery of the nature and origin of money. We are familiar with railway tickets and theatre tickets. Money is a ticket with a wider range of validity, but there need be nothing mysterious about it. Somebody writes up the tickets and somebody cancels them. In modern industrial society with its almost complete specialization of production, the individual citizen as a rule plays some small and specialized part in producing the necessary wealth—that is, the goods and services—which we need. Money is the means by which he can dip into the common pool, so to speak, and satisfy his needs. Money is, therefore, the means of distribution—the link between production and consumption—often a missing link! Generally speaking, the individual must have money to live, so that money is for the individual an indispensable licence to live, and sometimes a reprieve from death, as dramatic occasionally as the arrival in the nick of time of the galloping King's messenger! How often a reprieve from misery and famine! "When the factory gates are closed the workers . . . and the nameless multitude behind them must shake hands with Famine and lie down with Misery." Proceeding from this, we can agree that money is a means of power. Those who possess it can direct the activities of those who do not, as a condition of giving them money; whilst those who control the general supplies of money can also direct the general activities—money for this, but not for that.

#### The Evolution of Money.

In very early days exchange of goods took place no doubt on a basis of barter, and it is obvious that as soon as activities began to be specialized and trade to develop, there would emerge the need for a convenient means of exchange. Corn, oil, cattle, sheep, skins, women *et cetera*, were awkward things to equate and exchange. In early Greece—as may be read in Homer—a woman who was skilled in several useful arts was worth four oxen! The need for some measure of exchange value or universal equivalent, as Marx put it, was met by the use of precious metals, gold and silver, and a unit of weight of gold, for example, was equal to so much corn, oil, so many cattle or so many sheep. It became the measure of exchange value. The gold standard was born.

The history of gold is as old as that of civilization. It was probably the first metal to be used by craftsmen. In

his "History of Civilisation", Perry emphasizes the extent to which it was used in the earliest days of Egypt, and propounds the theory that the civilization which began in the delta of the Nile spread from there over the greater part of the world. Adventurers or expeditions from Egypt, according to this theory, travelled, largely in search of gold, to remote parts of Europe and Asia and even across the Pacific to the Americas, taking with them their knowledge of cereal culture and irrigation; and in most places where today gold is mined there are to be found remnants of early Egyptian culture. Elliot Smith has described the vast religious significance and mystical reverence which attached to gold in ancient Egypt. Small wonder, then, that throughout ancient history gold figures largely as the symbol of wealth and as an important means of exchange. The standard of exchange value was a weight of the precious metal. In early times it was made up into rings or loops, some of which could be linked together into chains, and these rings served as a means of exchange—the ancient ring money; this was used over the ancient world, having been found, for example, in Ireland, where, as presumably elsewhere, it apparently preceded coinage by many centuries. This ring money passed by weight, not by tale or number, as the later coinage did.

According to the text-books on numismatics—on coins, those "fossils of history"—the first money which passed by tale appeared in Greece about 800 B.C., and was not of gold, but of iron and of silver. There was a quite large spike or *obolus* of iron, of such size that six of these were a handful or *drachma*, and these are still the names of coins in Greece. The earliest gold coins are said to be those of Alexander the Great, which were coined in large numbers and were later called *Philipps*. Such money was, of course, intrinsically valuable as opposed to token money. It carried confidence in its very composition. It was itself real wealth and exchangeable as such even beyond the domain of the issuing emperor or authority. The first gold coins of Rome appeared in 217 B.C.; but the Romans had at a much earlier date used money of copper or bronze in rectangular slabs of from one to ten pounds' weight, impressed on one side with the image of cattle or sheep, which explains the derivation of the word *pecuniary* from *pecus*, meaning cattle. The pound was the Roman *libra*, parent of our pound troy, and divisible into twelve *unciae* (ounces). After that the Romans had a silver coin, equal to ten copper *asses* and called *denarius*—a piece of ten *asses*. This coin became the parent of the penny of the Anglo-Saxon coinage. Finally, a homogeneous coinage in the modern sense, of gold, silver and copper, was widespread over the whole of the Roman Empire, including Britain, though Greek silver coinage had reached Britain at an earlier date and had been imitated there.

The metals were not, however, by any means the only forms of early money. It is certain, for example, that the use of cowrie shells as a means of exchange goes back to very ancient times, and it has continued until recent times. The skins of animals have also had exchange value from the earliest times; it is said that in trading a hide the owner would cut out a piece, which would represent the hide, and that whoever held the piece could claim the hide. Such pieces would be early examples of token money, representing value, though having no inherent value themselves. They could be used as a means of exchange, but their value would depend on credit—that is to say, on the belief that the hide was there and could be secured when the piece was produced. Over the ages, many objects have been used as token money. The Chase Bank of New York has a collection of many thousands, including pieces of wood used in America itself during the recent depression when so many banks were closed.

We can well appreciate, however, how precious gold must have been, how eagerly it was sought, and how desperate must often have been the need of kings and princes for stores of gold or supplies of money in the form of gold, and how money-lending, usury and money changing developed. So also, as we come towards modern history and the developing commerce and industry of the last few centuries, we can realize, on the one hand, how

supplies of gold affected the development of that commerce, and on the other, how money-lending gave rise to banking and eventually to modern banking.

#### The Evolution of Banking and Bank Credit.

To take the latter point first, it is said—and we can well believe it—that banking originated with the early goldsmiths, who developed safes and were able to store and keep gold in safety. The merchants of London once deposited £162,000 in gold in the Tower of London for safekeeping; but the King seized it! It is said that merchants deposited gold in the keeping of these goldsmiths, who issued receipts for the gold so deposited. When one merchant wished to pay another in gold, he could, of course, get the gold from the goldsmith, and pay it to another merchant, who in turn would deposit the gold for safe keeping. Obviously it was much simpler to pass the receipt direct from one merchant to the other without moving the gold at all. So the goldsmith found his receipts being used as money, as a means of exchange, and such receipts were the forerunners of bank notes. Goldsmiths also acted as money-lenders, and it is only natural, when they found themselves holding gold on deposit which was never disturbed, that they should use that gold as a basis for loans to borrowers. It was thus that banking developed. The banker receives coin of the realm as deposits, finds that his notes serve as money amongst his customers, and beyond that circle, finds also that his customers transfer deposits from one to another by written authority or cheque (this practice existed in England in the seventeenth century) and that it is not necessary for him in practice to hold cash equal to his deposits, because depositors relatively seldom require cash and carry out their big transactions by cheque. Thus there developed without any legal authorization and without the knowledge of the general public the astonishing situation which exists today and which has only begun to be revealed within the last 25 years. The stability, so-called, of banks has, in fact, depended all along upon the confidence of the depositors. There has never been a stable bank or a strictly honest banker. Banking has always been a confidence trick. If the depositors lost confidence and tried to take out their money in gold or legal tender, the bank inevitably had to close its doors and fail. Eight thousand banks in the United States of America closed their doors during the recent depression. The bankers were like that early gentleman with the cowhide; but they cut pieces out till there was no hide left, or they left one hide in the window with one hole in it, and cut up all the other hides. All was well, as long as no one asked for them. I exaggerate a little, but not much. The bankers kept some gold and coin of the realm; but they have always issued notes for, and "lent", far more than they had.

Consider now for a moment the question of the amount of money in circulation. As organized manufacture and trade developed, and particularly as industry became mechanized, there was a corresponding increase in the need for money, and since the basis of currency in western civilization generally consisted of gold and silver, there was a great demand for these metals. The supplies derived from the discovery of the new gold fields in various parts of the world assisted in the development of industry and world trade generally. It is said that the inflow of gold from Mexico and Peru raised prices in Europe 600% within a century. Later, the level of prices bears a distinct relation to the opening up of the Australian, Californian and South African mines and to the introduction of the cyanide process. We can understand how the bankers dared not lend more than a certain multiple (X times) the money they really possessed, so that as new gold fields were discovered and the gold was "bought" by the banks, the latter were able to expand the "money supplies". That "buying" of gold was interesting, too. The banks credited the customer with the value, or perhaps they paid for it in golden sovereigns. True; but the sovereigns came back into the banks, which were therefore "as you were" *plus* the new gold, *plus* the ability to expand their loans! So gold was the basis of the currency, the standard coin was of gold of a certain weight and fineness, and the bank notes

issued by the banks were redeemed in gold if required. This was the position before this and other countries went off the gold standard. So we had the position which, as already stated, began to be revealed or become generally known to the public some 25 years ago. The legal tender or "real money" in Australia, for example, amounted to £50,000,000 in gold, notes and coin. It was held partly in the tills or coffers of the bank and partly in the pockets of the public, and was the sum total of legal money in existence. But if there were added together the total "deposits" lying in the banks to the credit of the innocent public, the final sum would be found to total nearly ten times this amount! What money is this, this other £450,000,000? That is the so-called bank credit—a precarious mountain of counterfeit. Its only physical form was that of figures in the ledgers of the bank, and it was "based" (as it was called) upon the gold and legal tender held by the banking system. A monetary supplement of *The Times*, published in 1933 as a book under the title "Gold", contains the following passages:

In the fifty years before the war bank deposits increased 2½ times. Its chief causes included . . . progress in banking technique whereby the banks learnt an art whose very existence they have often denied—the art of creating credit out of nothing. . . . As Mr. Hawtrey put it, "on top of the gold was a mass of currency not proportional to it, and on top of that a mass of credit not proportional to the currency".

#### The Gold Standard.

The British currency was officially a silver currency until 1812, when the sovereign was fixed at so many grains of gold to a certain fineness; thus the price of gold was fixed at roughly 85s. to the ounce, and the Royal Mints undertook to give sovereigns in exchange for gold and *vice versa* on that basis.

During the latter part of the nineteenth century, most of the continental countries and the United States of America adopted this gold standard, fixed the value of their currencies in gold and undertook to buy and sell gold freely at that price. Thus the total money in each country was linked to the gold held by the banking system. If gold flowed into a country, the banking system was able to increase the money supplies; the banks "looked for business", industry was encouraged to expand, the demand for goods increased, prices tended to rise and prosperity ensued. If, however, gold went out of the country, the banking system was forced to reduce its amount of credit money, prices tended to fall and business to stagnate, and unemployment resulted. The operation of this gold basis, and the freedom of clients to obtain gold on demand, had some effect in stabilizing price levels. If prices were high in a country, then it was cheaper for importers to pay for foreign goods in gold rather than in goods, which, as stated, were highly priced, so that gold tended to leave the country, and this, as we have just seen, had the effect of reducing prices. If, on the other hand, prices were low in a country, it was easier for foreign buyers to pay for the goods they wanted with gold, rather than with imported commodities which would have to compete with the cheap goods. Thus gold tended to flow in, with the consequent increase of money supplies and raising of price levels.

One can see how a gold basis for currency would have some automatic effect of stabilizing the purchasing power of currency, in a miraculously stable world in which gold had a miraculously fixed value. But it was not, is not, and let us hope never will be, a stable world, and other methods of stabilizing the unit of exchange must be employed.

The wide adoption of a gold standard of the value of currencies, provided it was adhered to, and provided that the banking authorities in the various countries were willing at all times to exchange their currencies for gold or *vice versa* at that value, had also the alleged advantage that it facilitated foreign trade and exchange. It fixed the exchange values of currencies. A merchant buying or selling abroad and making long-term contracts could be sure of payment if he so desired in gold, and that gold was then exchangeable at a fixed rate into his own



currency; so, it was argued, he always knew where he stood.

But consideration shows that though this gold standard may have had some advantages for some people, it was at the same time an illusion and had many other disadvantages. In the first place, to decide that gold or any other commodity has a fixed value is on the face of it nonsense. Value is not easy to define. It means, in general, desirability, and there are the two aspects—namely, exchange value and utility value—terms which more or less explain themselves. In general, nothing has exchange value unless it has utility value; but some things, such as air, or water where it is plentiful, have utility value without having exchange value. The quality of value is obviously a relative one. A lump of gold, for example, or a glass of water may have great or little (exchange) value, according to circumstances. In general, however, the exchange value of a commodity corresponds or should correspond as nearly as possible, as Marx said, "to the amount of socially necessary labour incorporated in the commodity". That is quite a useful idea to bear in mind. The definition has a natural validity—natural in the sense that it is not a matter of convention or arbitrary determination. It appeals to our sense of rightness that in exchanging goods between human beings the exchange should be on the basis of amount of labour incorporated in the respective articles. We feel uncomfortable in buying cheap goods made by sweated labour. There can be no such thing as a fixed value for gold or for any substance. Both use value and exchange value must vary according to circumstances, supplies, uses, discovery of substitutes and so on. The commodity which has registered the most fixed value in the United States of America is soda! No one denies that gold has a value, as have other forms of wealth; but the fact is that the value of every commodity varies naturally with time and circumstances. A fixed value is a pretence, and a dangerous one. As King Canute showed, Nature is indifferent to decrees. It is human beings who get wet, and that is what happened when the value of gold was "fixed", and will happen again if the gold standard is reimposed. As we now understand the nature and function of money, however, it is literally monstrous that so important a mechanism should be based on any pretence at all.

The international gold standard, as outlined above, came to an end with the outbreak of the First World War. Some years after the war there was an effort to reestablish it, and England returned to it. But these efforts collapsed with the financial depression, and the United States of America has been left carrying the baby—a gross and embarrassing moron, carefully nursed in the vaults of Fort Knox.

#### The Modern Monetary System.

The modern monetary system is essentially a ticket system. Money in Australia has consisted of two fractions, a smaller fraction, legal tender—that is, notes and coin issued by the Government—and a much larger fraction consisting of bank credit created by the banking system and recorded in its ledgers. The legal tender serves in the main as the pocket money of the community. It is constantly circulating in and out of the banks, largely on a weekly basis, out of the banks towards the week-end, into the pockets of the people, and back to the banks through the retail traders. But most of the big scale business of the country, over 90% of the total, is carried on by the use of bank credit, transferred by cheque from one account to another in the ledgers of the banking system, which thus operates as a book-keeping system for industry.

The total money in existence in Australia before the war was about £500,000,000, but it was not static. A continuous process of creation and cancellation was taking place. The creation consisted in the continuous issue of money to industry in the form of loans and overdrafts, whilst its destruction or cancellation took place when the loans or overdrafts were repaid. It will be understood that the issue takes place to industry mainly for the purpose of production of goods. Industry passes it as salaries, wages, profits *et cetera* to the people, who in turn buy the

goods, and industry, being paid for the goods, repays its debt to the bank. Any one unit created as an integer in a bank ledger will pass from page to page in the ledgers and may take the form of a coin and go out to the public through pocket, till and pocket, before returning to its entry in ledger form for cancellation.

It is emphasized here that, just as a continuous production and consumption of goods are taking place, so also a continuous creation and cancellation of money are occurring, and that the latter—that is, the issue of the money—determines the former—namely, the production of the goods. This generalization is almost dangerously simplified; but it is fundamentally true and necessary to an understanding of the power and of the function of money. Thus it is possible to say with truth that although there was at any one moment in a year only about £500,000,000 in existence in Australia, yet in the course of the year the banking system had created and cancelled perhaps three or four times that amount—well over £1,000,000,000 in the year!

It will be understood also how the industrial system, in producing goods, generates "costs", which appear in "prices", and how the money, advanced to industry and passed to the public, is returned to industry and cancels the costs; and further, how one unit of money, issued to industry and passed to the public, on being returned to industry and back to the banking system, can cancel only one unit of cost. This point is emphasized in order to expose the fallacy that any particular unit of money, whatever form it may take for the time, can "circulate" and cancel many costs in industry, and that, therefore, the amount of money needed in the life of the community is difficult to calculate or control properly. This alleged difficulty is part of the smoke-screen covering a subject which is complicated enough without deliberate obscuration. In general, as is indeed common sense, the amount of money needed corresponds to the volume of production which is desired, as has been so abundantly illustrated by the great financial depression and by the war, and further, the amount of money in the hands of or standing to the credit of consumers at any one time should correspond approximately with the prices of consumable goods on sale at that time.

During the financial depression the rate of creation and cancellation of credit money was slowed. In fact, the creation almost ceased; but the banks, mortgagees, landlords *et cetera* endeavoured to get back loans, interest and rent at the same rate as before. Many people were made bankrupt or were dispossessed, many concerns came under the control of the banks, and business stagnated, with all the effects we know. That murderous depression, with its dreadful effects on physical and mental health, was purely a man-made monetary calamity. The "blizzard that struck us" was not a natural phenomenon, despite the innocent astonishment and astrological inquiries of our economists.

The preparations for the present war, however, and the war itself, with the immensely increased production required, have necessitated a great increase in the supplies of money, to the jubilation of politicians who saw the solving of the unemployment problem, and of the people whose poverty was relieved, and to the consternation of the banking fraternity who see well enough the difficulty of explaining how easily money can be produced when obvious necessity demands the full employment of resources.

Such is the madness of a world directed mainly by powermongers, and in which it is accepted that work or employment is the end of man, and not the exercise of his creative faculties and enjoyment of the goods he creates! What, however, is the purpose of production? Obviously it is consumption, and the business of a monetary system should be to facilitate that.

The present world crisis is a phase, or the development of a phase, in the age-old struggle for liberty—that is to say, for freedom from oppression or outside control. The power complex presents a difficult problem, the solution of which has to be faced. In general, power appeals to men because it satisfies one of the innate dispositions or



instincts—namely, that of self-assertion. Obviously we may assert ourselves in many ways, some good, some bad. The good ways include those of creative achievement in the arts and sciences, and in social organization—that is, leadership in a good sense—not that of the decoy sheep in the slaughter yards, who, by the way, besides having a bad conscience, must have a haunting fear that the butcher may one day fail to recognize them! The bad ways include those depending on power, on the ability to compel other men to obey our will. Throughout history power has been exercised to a large extent through physical violence, or the threat thereof, and in the last resort it is so still; but from early days it has also been exercised through the possession of wealth and the control of money. Those who possessed wealth have been powerful as compared to the relatively destitute.

As civilization has progressed and physical violence has been increasingly frowned upon, the indirect exercise of power through control of money has become increasingly important, and has been practised consciously and subconsciously by those who were astute or lucky enough to become wealthy. What power resides in the control of the money supplies, now that money may reasonably be called the life blood of a modern community? Few monarchs have exercised such power as have the international financiers of modern times. America has to a very large extent been governed by its major financiers through the Federal Reserve Bank, Britain by the Bank of England, France by the Bank of France, and so on. A member of Ramsay MacDonald's Cabinet in England described how "twenty men and one woman of the British Cabinet waited one black Sunday afternoon in Downing Street garden 'for a financial decision from the Federal Reserve Bank in New York'". Mr. Graham, speaking in the House of Commons on September 10, 1931, said: "It was specifically put to us [the late Ministers] that, unless one item in particular—a 10 per cent. cut in unemployment benefit, to yield £12,250,000—was included in the programme, it would not restore confidence, and we were told that no other item could be put in substitution. . . ."

One of the earliest of the great international financiers said: "Let me make the money of the country and I care not who makes its laws." Great statesmen such as Lincoln and Gladstone repeatedly referred to the overwhelming power of money, and Lloyd George, speaking of the Versailles discussions after the last war, described how "statesmen, jurists, etc., were swept aside by the financiers". The late Pope Pius XI, than whom probably no one was better informed on temporal matters, stated in one of his Encyclicals: "Those who control credit possess such power that none dare breathe against their will."

Some men smile deprecatingly at revelations such as these; but they are a sufficient explanation for the blazing paradoxes that have torn our world asunder and have almost, if not quite, destroyed our hopes of peace and progress.

#### Money as a Useful Mechanism.

The reality of the monetary system is that in its early form it was a system of real money, an intrinsically valuable means of exchange, and that it has changed to a ticket system, the tickets signifying claims to wealth—that is, to goods and services of a certain value. The changes in the monetary system have on the whole, and no doubt of necessity, corresponded with the change in the methods of production—from the days of slavery and feudal times, through those of crafts and guilds, to the development and the recent enormous growth of organized, specialized, mechanized, large-scale and long-term production of the kind which is called capitalist. The change, especially in its later rapid stages, called for the use of more and more money. Even if the supply of precious metals had been equal to the demand, they would not have furnished a satisfactory mechanism, and there is no doubt that the invention of bank credit and the free use of cheques has certainly been of huge assistance to the development of modern industry. No reasonable person wants to abolish the existing financial institutions or to injure the legitimate interests of those employed therein.

The monetary system of bank credit and currency, which constitutes the ticket system of today, is really a wonderful, beautiful mechanism; but it should be used and controlled in the public interest, and not as a means of power in unknown hands. It is a credit system. The validity of money today depends naturally on belief, on confidence, in our fellow men. There is no escape from the severity of this condition, and any attempt to support it by a pretence such as a gold standard is doomed to failure; and how can one have confidence in it when no one knows who controls it?

The problem is, therefore, to make the system a good servant. There must be, for example, enough tickets, the right number, neither too many nor too few. It would be too bad if a train went out empty or a theatre was but half-full, merely because there were not enough tickets, and it is certainly too bad if far too many tickets are issued for one particular train or theatrical performance. The organization of an effective ticket system for our economic life is, of course, far more complicated; but just as it would be ridiculous if a railway system or a theatrical undertaking was controlled by the men who printed tickets to suit their own convenience, so it is mad that the fate of the world should be in the hands of powermongers who write up the money supplies to suit theirs. The ticket system must be run in such a manner that the purchasing power of the unit is kept as stable as possible, and economists and statisticians in various parts of the world have in recent years had some practice in that activity. Gold must be permanently dethroned as the unit of value. There is and will be terrific opposition to proposals such as these. The present holders of power will struggle desperately to retain it. How will the privileged classes in South Africa view it, and shareholders in gold mines everywhere? The attitude of financiers and their satellites generally has been, of course, that "you don't understand", and—*sotto voce*—"you are not going to if I can help it".

Another attitude appealing to the simmering fear and nose-length vision of us mere laymen is "don't breathe on the works; don't, in any circumstances, breathe on the works"; but the recent experiences of our own community in financial depression and in war and the achievements of the Russian people and of "bankrupt" Germany and Italy have clearly shown that the works are of such major importance that they must be taken out, cleaned up and placed in charge of the most capable and responsible financial engineers.

As I have said, desperate efforts will be made in our countries to retain the control of finance in secret and private, though perhaps ostensibly public, hands. The American Treasury has recently issued a pamphlet pleading for a post-war international monetary system, ostensibly to facilitate world trade and exchange, and this money is to be "linked" to gold.

#### International Exchange.

One of the major arguments of those who advocate that gold should be given a fictitious value and an important place on that account in regulating money supplies, lays special stress on the difficulty and perplexity of problems connected with what is called foreign exchange—that is, the method of accounting of, and of settlement for, international trade, international loans *et cetera*, the loan being, by the way, merely a loan of goods—that is, trade on long-term basis.

This problem of international exchange and of international settlement is a complicated one, the details of which cannot be entered into here. It must suffice to repeat that international trade, loans *et cetera*, are always in reality a matter of the exchange or loan of goods, and that the goods at the time of their production have a certain exchange value in terms of the units of the currencies of the country concerned, and that in any settlement of debts, whether prompt or postponed, common sense and justice demand that the payment should be calculated to return an equivalent amount. Unless great care is exercised in the control of the supplies of money, the purchasing power of the unit will vary and its function will be correspondingly impaired. Obviously it is necessary

to avoid circumstances in which a debtor could discharge his liability with goods having merely a nominal value, or in which the debtor would be forced to discharge his liability with goods having a very much greater value; but a mechanism by which the value of currencies is recorded as a cost-of-living index, suggests a means by which international debts and balances could be equitably recorded without dispatch of a yellow metal across the oceans of the world and the naive assurance that the yellow metal represents so much value. Anyhow, we might as well use painted bricks, but better still, of course, straightforward records—"IOU's".

We must resent and resist any attempts, wherever and by whomsoever introduced, to link the value of our own ticket denominations to any relatively rare commodity such as gold, and in particular we must resist the efforts of international planners who, under the pretext of ensuring world peace, would again wield power by controlling our money supplies. These international planners are hard at it. It may even be that some of their servants in Australia have already attempted to bind us in this matter secretly and in a most undemocratic manner. The control of our own money supplies is our own concern. It must, indeed, be our primary concern; and we must strive, desperately if necessary, to ensure that we are not hampered from without or from within by plots to base our ticket system on a rare or relatively rare metal, for then our money would be "hard to find", and we might well be puzzled as to where it was to come from. Then the plans of all decent people for improvements in health and education could be set at naught and their desire that our resources should be fully employed for the common good could be frustrated.

In what has been written above no attempt has been made to go into the details of the effects upon health of the restriction of the money supplies and of the misuse of the power which the control of finance confers upon those who wield it. The experience of medical men is such that they will have no difficulty in supplying the details. Similarly, no reference has been made to the danger of the relative oversupply of money, the bog of inflation. It suffices to say that inflation is never automatic, and that on the few occasions when it has in foreign countries been carried to damaging lengths, it has always been due to the deliberate action of those in control; and it would be so if it occurred here.

Finally, it will be appreciated that although the emphasis of the title of this paper is upon gold and the gold standard, more is required than the mere abandonment of that standard, the evil of which is that it elevates a convention—a most arbitrary convention—into the rank of a natural law, so that those operating the system can claim that its Moloch-like demands cannot be refused by anyone and that the controllers are doing only what is forced upon them by the iron laws of economic and financial necessity. There are no such laws. The monetary system is a marvellous invention for facilitating the production and distribution of wealth, and it must be managed by a public authority in the public interest.

#### Summary.

1. The relation of gold to health is discussed in the aspect of gold mining, of which silicosis is a grave hazard, and in the more abstruse aspect of its use as a standard of value.
2. An attempt is made to survey the evolution and functions of money, and the relation of gold to money, from ancient times to the present day.
3. It is shown that gold served to buttress the early forms of token money issued by banks, and that the general adoption of the "gold standard" in the nineteenth century may have served in some degree to stabilize currencies and to facilitate international trade, but that it is a dangerous pretence to regard the value of gold as fixed and as a measure of value in general.
4. Modern monetary systems are described as ticket systems, which can be admirably adapted to facilitate the production and distribution of wealth, and it is shown

that the validity of the tickets must depend, not on the pretence of a gold standard, but on the confidence of those using them and on the skill and integrity of those controlling them.

5. It is shown that money is the means or instrument of power in modern civilization, and that its management in any community must play a major part in determining the degree of liberty and the health and happiness of the people of that community. It is suggested that current proposals for the establishment of an international authority which would control an international currency based on gold, and could interfere in the management of national monetary systems, are to be regarded as a grave threat to the liberty and independence of nations who desire to remain free and independent and to develop along democratic lines.

#### Conclusion.

The health or well-being of a community is greatly influenced by economic factors. The Australian monetary system is the keystone of Australia's liberty and democratic progress. It must be defended from outside interference, freed from all pretence of dependence on a gold standard, and managed by a responsible public authority.

### THE MANAGEMENT OF ESTABLISHED WOUND INFECTIONS.<sup>1</sup>

By HUGH R. G. POATE,

*Group Captain, Medical Services, Royal Australian Air Force; Consulting Surgeon to an Australian General Hospital, Australia.*

THE choice of subject for my address was prompted in part by the pitiable state in which some of our wounded men arrived back from the Middle East and New Guinea, and in part by the fact that the treatment of established sepsis is the Cinderella of surgery.

Relatively an enormous amount of trouble is taken to prevent infection from developing in "clean" surgical cases and in recent wounds; but apart from those surgeons dealing with burns and doing plastic repair work, little attention seems to have been given to the control of frank suppuration—much less nowadays, in my experience, than was given during the Great War. One reason for this is the abuse of the "closed plaster" technique. Once patients have reached a base hospital where they can be retained, plaster casts should be abandoned in the majority of cases. I am one of those who consider that the nauseating stench of foul wounds which characterized the primitive hospitals of pre-Lister days, and a reversion to "laudable pus", have no place in the modern treatment of infected wounds. The all-pervading and sickening odour of stinking plaster permeated with blood and pus has a depressing and even demoralizing effect on the patients and on the nursing staff. The continued loss of plasma protein in running pus has a debilitating effect on the patient, and the chronic toxæmia with its associated pyrexia has a harmful effect on the constitution of his blood and on his tissues generally. Loss of appetite leads to avitaminosis, and before many weeks we see a gaunt skeleton with atonic, wasted and putty-like tissues, mental hebetude and a frightened, despairing facies—all that is left of a fine young soldier, who entered the battle in the full flush of manhood.

The old adage that "prevention is better than cure" cannot be applied to many of our battle casualties in respect of infection of wounds, owing to the difficult terrain and the fearsome conditions of present-day warfare, which make work difficult for surgeons in forward areas. Plaster is invaluable in providing comfort during transport, and has proved to be a life saver in many cases. Let us keep it as a good friend; but do not let us abuse such a friendship, once we are in a position either to replace or to associate it with other methods which will

<sup>1</sup> A post-graduate lecture, delivered on August 23, 1943.

ensure that measure of comfort, stability and cleanliness necessary for restoration to as near normality in mind and body as the injuries will permit.

A distinction must be made between superficial wounds involving skin and soft tissues only, and deep wounds where bone, joint or thoracic cavity is also involved. It is surprising how many men with superficial wounds are allowed to develop chronic sepsis and to arrive at a base hospital as problems for the plastic surgeon. The technique developed by Major Rank, of saline baths and sulphanilamide powder, will clear infection rapidly in some 90% of cases and allow of early skin grafting or some appropriate plastic repair. This applies particularly to patients with burns, who do remarkably well in saline baths.

In the other 10% of cases, and especially in those in which sulphanilamide-resistant streptococci persist, some other form of antiseptic treatment will prove efficacious. The most promising is the use of one of the acridines, of which I shall speak later.

My main concern is with deep wounds, and especially with those associated with bone and joint injury, most of which drag on for months or years, or else have to be finalized by amputation.

#### The Condition of the Blood.

First in importance as regards treatment comes the maintenance of the blood to as near the normal as is possible. Repeated checks on the number of red cells and the haemoglobin content of the blood are much more important than estimation of the number of leucocytes. It is impossible for normal tissue reaction to occur and general bodily vitality to be maintained in the presence of a severe secondary anaemia, and it should be a cardinal rule that all patients with a haemoglobin value below 60%, and very ill patients with a haemoglobin value below 75%, should receive sufficient blood by transfusion to keep their haemoglobin value as near 100% as is practicable. If you are going to give blood, give it in adequate amounts, and do not expect 500 cubic centimetres to do anything more than just tide the patient over a crisis. One of the most striking lessons learnt has been the relatively large dosage necessary for the temporary rehabilitation of the subject. I say "temporary" advisedly, for often repeated transfusions may be necessary within a few days or a few weeks to maintain a haemoglobin level approaching normal, especially when haemolytic streptococci or staphylococci are the infective organisms.

Once sepsis is under control, it is surprising how the blood will maintain a high level of haemoglobin, and conversely, once you bring the haemoglobin level near to normal, it is also surprising how much easier it is to control the local infection.

A fact not generally recognized is the importance, from the anaesthetist's point of view and particularly when repeated anaesthetics have to be given, of having the red corpuscles well charged with haemoglobin.

In anaemic patients an unrecognizable anoxia is easily induced, and such a state will increase the tissue damage, especially in the liver, one of whose most important duties is its detoxicating function. This is one of the reasons why so often after a relatively minor operative procedure the patient suffers a severe reaction and may be ill for several days. Glucose given by mouth before operation and by intravenous injection after operation is the best means of countering this type of reaction.

Another cause of post-operative reaction is a "flare" of sepsis, usually the result of the breaking-down of the protective granulation tissue barrier which, once established, is the best check to spread of infection. Consequently, in the removal of sequestra, care should be taken to avoid opening fresh tissue planes and to preserve the granulation tissue; never use a curette on a sequestrum—a procedure employed too often. If time permits, sulphonamide therapy in full dosage should be instituted for two or three days prior to operation, and carried on for several days afterwards.

Malarial infection in the blood stream has proved a great trouble among the New Guinea casualties, and when associated with chronic sepsis it does not produce the

usual clinical manifestations. A rise of temperature creates concern, as one cannot determine its cause for a day or two. When malaria is known to be present, it is wise to give some specific treatment for two or three days prior to any operation; but remember that quinine and sulphonamides should never be used in conjunction. "Atebrin" is quite safe. Malarial patients do not respond to the usual anti-malarial treatment at all well if gross sepsis is present; but once drainage is established, sequestra are removed and infection is under control, then the malaria can be controlled by the usual methods of treatment.

#### Bacterial Flora of the Wound.

Before discussing treatment, I should like to draw attention to the necessity for knowing exactly what type of infection is present in the wound, as this largely determines both local and general treatment. The question of surgical sterility as contrasted with bacteriological sterility must also be considered, but will be mentioned at a later stage.

Colebrook classifies the bacterial contaminants of the skin into "resident" and "transient" classes. The chief "resident" flora includes staphylococci, sarcinae, non-haemolytic streptococci, diphtheroids and various spore-bearing aerobes, to which may be added a variety of other non-pathogenic bacilli. They are generally more numerous on the exposed than on the protected parts of the body, except in the perineum and nearby regions, as well as on the lower part of the abdomen. The "transient" flora comprises organisms collected fortuitously from extraneous sources, such as haemolytic streptococci, *Bacillus coli communis*, *Bacillus pyocyaneus*, *Bacillus proteus*, *Bacillus diphtheria* and probably *Staphylococcus aureus*, especially of the coagulase-forming variety which has such a capacity for toxin production and is so damaging to bone.

It is well known that for practical purposes surgical sterility of the skin may be obtained by washing it in hot water and soap for five minutes, when the transient flora can be eliminated along with most of the resident organisms; but bacteriological sterility cannot be obtained even after the use of such powerful and penetrating antiseptics as the halogenated xylois, "Zephiran" or iodine. Despite this, we expect our clean wounds to heal by first intention.

War wounds are made through unwashed skin and are often contaminated with soiled clothing or extraneous debris, so we must expect immediate infection. As we are not concerned with the early treatment of war wounds, nothing will be said on this subject, even though it materially influences the evolution of chronic sepsis.

The commonest organisms present in established wound infection are haemolytic and non-haemolytic streptococci, *Staphylococcus aureus*, *Bacillus pyocyaneus*, *Bacillus proteus* and coliform bacilli, along with the various resident organisms of the skin, the most common being diphtheroids. Infection or reinfection of the wound and cross-infection appear to be either disregarded or regarded very lightly by most surgeons, and their casual attitude to chronic sepsis and their bad habits with regard to the dressing of wounds are apt to be adopted by the nurses. Badly placed, poorly applied or insufficient dressings are more often the rule than the exception in infected wounds, and the surgeon frequently permits conditions which would be abhorrent to him in the case of clean wounds.

Only by the maintenance of an aseptic technique, and by the adoption of the principles enunciated in the Medical Research Council Bulletin Number 6, can cross-infection in hospital wards be controlled. Masking of both patients and dressers is as essential as is the development of a "no touch" technique. Efficient surgical cleansing of the whole area of the patient's skin which is to be covered by dressings and bandages is necessary each time the dressing is taken down, if reinfection of the wound is to be prevented—a point in technique which is more often overlooked than observed. Bed linen should be changed at once if any soiling occurs, and sterile blankets should be provided each week. The greatest care should be taken during dressings to cover the bed, splints or any exposed skin around a wound with sterile towels.



The bacterial flora of the wound should be checked regularly at least once a week, as this is the only control as to the efficiency of one's local treatment.

For success in plastic work and in skin grafting the hemolytic streptococci, *Bacillus pyocyaneus* and *Bacillus proteus* must be abolished, as must any gross infection by staphylococci or other pathogens; that is, the wound must present firm granulations without obvious pus.

It is to be remembered that various antiseptic agents have a decided selective action against different organisms, the outstanding examples being the flavines against streptococci, crystal violet against staphylococci and acetic acid against *Bacillus pyocyaneus*.

#### Local Treatment.

It is taken as a matter of course in connexion with wounds involving bone and joints that established surgical principles regarding adequate and effective splinting must be followed. I have already referred to the abuse of the "closed plaster" technique, which should be abandoned in most cases once the patient is in a hospital where stabilized treatment can be undertaken. No local treatment can control sepsis so long as there are dead tissues in the wound. A meticulous search must be made for sequestra, most of which are the direct result of staphylococcal toxins, which have a peculiarly destructive effect on bone. As far as is anatomically possible, all dead space should be opened up and free drainage established.

If the tissues and general condition of the patient are grossly debilitated, one must be on the watch for gravitation abscesses which, if found, must be drained at the most dependent spot with a fair-sized rubber tube; this is preferable to a glove drain. I do not like "Vaseline" gauze used for such a purpose, as it is more apt to act as a plug than as a drain, and dry gauze is worse.

Local application of sulphanilamide is useless when there is a free purulent exudate. Para-aminobenzoic acid is present in large amounts in pus, and one must always remember that one part of this substance will neutralize 10,000 parts of sulphanilamide. The best results obtainable by sulphanilamide are in clearing streptococci from superficial wounds according to the technique laid down by Major Rank. It is useful in deep wounds occasionally, provided that no free pus is present, and provided that access is obtainable to the depths of the wound.

Occasionally one finds sulphonamide-resistant strains of streptococci which can usually be cleared away rapidly by one of the acridines. It is as well to remember that the other sulphonamides are not so efficacious as sulphanilamide in the tissues, and that in serous cavities sulphapyridine is actually harmful and induces the formation of adhesions. Sulphathiazole is not so soluble as sulphanilamide, so it may be used in conjunction with it when a more prolonged effect is desired.

The application of eusol, Dakin's solution and other hypochlorites will control gross infection and diminish pus formation if these solutions are used as a continuous irrigation for several days; but a consistently large bacterial flora is to be found in any deep wound under this form of treatment. However, hypochlorites are not so harmless to tissues as many people believe. They are actually destructive to leucocytes, are relatively slow in action and are inhibited by the serum proteins. Granulation tissue is inclined to become exuberant and flabby—a sure sign that a change of treatment should be instituted.

Hydrogen peroxide and saline solution have but limited application and act chiefly by a mechanical cleansing of grossly infected wounds, such as may be required before the application of sulphanilamide or one of the antiseptic agents. Iodine, the mercurial compounds, the phenols, the green and violet dyes and the frothy kationics are disinfectants which should never be used in wounds, because of their destructive action on the tissues.

#### The Acridines.

The term "acridines" is a more correct general term for this class of antiseptics than is the old name of "flavine", which refers only to a physical property—their colouring effect—and it is no longer applicable, as we now have a

colourless mono-aminoacridine discovered by Dr. Adrien Albert and Dr. S. D. Rubbo. These substances, introduced by Browning in 1914 for clinical use in the form of acriflavine and proflavine bisulphate, were first used in the treatment of war wounds in France during the Great War, in 1917. The particular value of the acridines lies in the fact that their bactericidal activity persists to a degree unequalled by that of any other antiseptic agent in the presence of the body fluids or exudates, they are non-toxic and non-irritating to the leucocytes and body tissues, and they inhibit or destroy a wide variety of pathogenic organisms.

It is unfortunate that the British Pharmacopoeia proflavine sulphate (really the bisulphate) is an extremely acid compound; this has been mentioned by Dr. Albert, who has pointed out that before use on the tissues it should be neutralized with one-fourth its weight of sodium bicarbonate, when its pH value in a solution of 1:1,000 is brought from the very acid 2.5 to a neutral 6.0.

Another disadvantage of the acridines used clinically in the past has been the intense staining they produced, so that everything took on a vivid yellow colour including the dressers' hands. Moreover, they have a high affinity for cotton, so that the old method of dressing wounds with moist gauze shut off a considerable amount of the substance from contact with the wound surface and its exudates (this being one reason why "Vaseline" gauze is now used). These factors combined to bring discredit on the acridines; but in recent years a better understanding of these substances has come about, and once again they are coming into prominence for the treatment of wounds.

Acriflavine was the most popular member of this group, probably because of its high solubility (1:3), so that dispensers favoured it for the making of stock solutions. However, it is four times as toxic as proflavine, and is really a crude and inconstant mixture of variable composition consisting of proflavine and its methochloride. Moreover, it is more costly to produce than proflavine. For these reasons this substance should be discarded, as proflavine sulphate (British Pharmacopoeia) is now being manufactured in large quantities in Australia and is satisfactory if neutralized as advised by Dr. Albert. But with the discovery of 5-aminoacridine, which is non-staining, has a pH of 6.0, and has all the virtues of proflavine even to an enhanced degree, it seems that this substance will in future be the chosen acridine for clinical use. Its commercial manufacture in Sydney is now an established fact.

For clinical use in septic wounds, a 1:1,000 solution of the chosen acridine is that generally used for irrigating or swabbing out the wound, which is then lightly packed with "Vaseline" gauze. One good point about the acridines which is not generally known is that they stay in the wound tissues for a considerable period of time in an active condition; thus they contrast sharply with most other antiseptics, the hypochlorites for instance. Moreover, by their power of inhibiting staphylococcal infection the amount of necrosis in bone is restricted and extensive sequestration seldom occurs in cases in which the acridines have been used early and intelligently.

In the *British Medical Journal* of October 10, 1942, Buttle and Mitchell reported a series of 80 cases in which proflavine sulphate powder (British Drug Houses) was used in wounds with established sepsis. I wish to stress the facts that in all the cases reported by them the wounds were heavily infected, that the powder was never employed on more than two or three consecutive occasions at intervals of four to twenty-eight days, that the average amount used was only 0.5 gramme, and that it was spread or dusted lightly over the granulating surfaces of the wound. I emphasize these points because proflavine bisulphate causes a definite escharotic effect on epithelial edges and on granulation tissue, owing to its high acidity. In all the experimental work reported so far the acridines used in powder form are found to be destructive to normal tissues, even 5-mono-aminoacridine and 7-diaminoacridine; but in 1:1,000 solution the two last-mentioned and neutralized proflavine can be applied even to brain tissue without damage.

I have used various acridines in powder form in the presence of gross infection, but consider that they are for occasional use only. The wound is cleaned by irrigation with saline solution, and then the powder is dusted or spread lightly over the granulating surface and rubbed in gently. "Vaseline" gauze or *tulle gras* is applied, the surrounding skin is cleansed, and then ample dressings are firmly bandaged. The wound is not dressed for three or four days, when irrigation is carried on with the 1:1,000 solution every day or two as may be necessary.

The powders I have used, and my order of preference for them, are 5-mono-aminoacridine (solubility 1:300) proflavine base (1:3,000) and proflavine bisulphate (1:300), the first two being neutral in reaction. They all produce a coagulum of lymph over the surface of the wound, which peels off in four or five days, leaving a clean surface with fine, firm granulations. The discharge dries, up and absolute bacteriological sterility of the wound can be obtained. The difficulty is to maintain this sterility until such time as the wound heals or until plaster repair of some sort can be undertaken.

We have experimented in various ways with deep wounds and sinuses, and find that a slow drip application of a 1:1,000 solution for four hours every second day, sufficient only to moisten the outer dressing covering the "Vaseline" pack, in addition to the covering of the surrounding skin over a wide area with Dr. Albert's greaseless ointment (acridine 0.1 gramme, starch 1.5 grammes, tragacanth 1.5 grammes, glycerin 50.0 mls, distilled water to 100.0 grammes) will produce what appears to be a surgically clean and healing wound, although it may not be bacteriologically sterile. One good feature about the acridines is that they inhibit or control most infective organisms, the most resistant being *Bacillus pyocyaneus*; but if this is present, acetic acid (2%) can be added to the solution, as it is quite compatible with the acridines. In passing, I may say that the acridines are also compatible with the sulphonamides. Besides being bactericidal even to the hemolytic staphylococci, and besides having a particular affinity for hemolytic streptococci, the acridines are also bacteriostatic, so that if the wound is not actually bacteriologically sterile there is no obvious clinical sign of infection. Another remarkable feature of wounds treated in this manner is the absence of any excessive or flabby granulation tissue.

#### Sterility.

Earlier in my remarks I mentioned that the question of surgical as opposed to bacteriological sterility was one which had to be considered. Just as it is impossible to secure complete sterility of the intact skin, so it seems impossible to secure complete sterility of a wound surface, or if such sterility does result from the use of one of the acridines in powder form, it cannot be maintained. However, from the practical point of view it seems that "surgical sterility" is secured by the abolition of streptococci, *Bacillus pyocyaneus* and *Bacillus proteus*, and by the reduction of the number of staphylococci, diphtheroids and other contaminants to a minimum—that is, to the stage at which the wounds show no obvious clinical infection. Secondary suture, skin grafting and plastic procedures can then be carried out safely and with the expectation of primary healing.

Before I conclude there is one fact which I should like to mention, and which was brought to my notice by Professor H. K. Ward; that is, the pronounced increase in the incidence of streptococci in wounds during unusually cold changes in the weather. This has been obvious in the bacteriological control of our cases during the recent cold weather.

#### Summary.

To sum up, the points I wish to make in connexion with the management of established wound infection are the following:

1. The great importance of maintaining the haemoglobin content of the blood as near to normal as possible.
2. The necessity for removal of all dead tissue and especially sequestra from the depths of these wounds.
3. The abolition of closed plaster technique in these cases once a stabilized form of treatment is available.

4. The inefficiency of sulphonamides as local applications in the presence of frank pus.

5. The great importance of the acridine antiseptics in the control of established and chronic sepsis.

6. The necessity for maintaining the skin surrounding wounds in a surgically clean condition so as to prevent reinfection.

7. The control as far as practicable of cross-infection in hospital wards.

#### Acknowledgements.

I am indebted to Colonel Wood, Commanding Officer at an Australian general hospital, to Lieutenant-Colonel Starr, Officer Commanding, surgical division of the hospital, and to Major Turnbull for their practical interest and help in the many problems concerned in the setting up of a satisfactory technique for the treatment of established sepsis in war wounds. Major Voss has been responsible for the pathological investigations and has been most cooperative.

The supply of "Monacrin" has been made available by Dr. Adrien Albert and latterly by Mr. Robinson, of Bayer Pharma Proprietary, Limited, and their advice has been most valuable.

#### Addendum.

Since the foregoing lecture was delivered, use has been made in a number of cases of an acridine emulsion made according to the subjoined formula as supplied by Dr. Adrien Albert. This has been injected into sinuses or poured into open wounds at intervals of twenty-four to seventy-two hours, and then a paraffin gauze wick or dressing has been used. The results have been most satisfactory.

#### Acridine Emulsion.

##### Mix together:

- |   |           |
|---|-----------|
| 1. Arachis, maize or other oil .. .. .  | 50 parts  |
| 2. Water .. .. .  | 25 parts  |
| 3. <i>Liquor Calcii Hydroxidi Saccharatus</i><br>(British Pharmaceutical Codex) .. .. . | 5.0 parts |

##### Then add:

- |  |           |
|--|-----------|
| 4. Proflavine sulphate or "Monacrin" .. .. . | 0.05 part |
| 5. Dissolved in water .. .. .                | 20 parts  |

The product is 100 parts of creamy emulsion, of which the watery phase contains 0.1% of the acridine.

#### KATIONIC CHEMOTHERAPY, WITH SPECIAL REFERENCE TO THE ACRIDINES.<sup>1</sup>

By ADRIEN ALBERT, Ph.D. Medicine (London),  
B.Sc. (Sydney),

Department of Chemistry, University of Sydney.

ANTI-BIOTICS—that is to say, substances that can destroy every known form of life—have long been known. The widespread use of certain of these substances to sterilize instruments and to disinfect excreta has given rise to the frequently expressed belief that "antiseptics are protoplasmic poisons". Such a sweeping generalization runs contrary to the principle of chemotherapy—to inflict maximal injury on the parasite and minimal injury on the host. It is evident, then, that we may grade all antibacterial substances according to whether they are chemotherapeutic and safe to use on and in the human body or merely anti-biotic and fit for use only on non-living matter.

That such a thing as chemotherapy is realizable depends on the fact that the entire metabolism of every cell is centred in its enzyme systems. These well-ordered and nowadays fairly well-known organizations of protein in association with comparatively simple molecules are alone responsible for the nutrition and reproduction of every pathogenic organism and every mammalian cell. A most

<sup>1</sup>"Monacrin" is the trade name for the locally produced 5-amino-acridine hydrochloride.

<sup>2</sup>Based on a lecture given under the auspices of the New South Wales Post-Graduate Committee in Medicine on August 23, 1943.

helpful simile is that of Professor R. W. Gerard, of the University of Chicago, who continually reminds his students that an enzyme is like a preacher: it can unite together any number of pairs of molecules without itself remaining permanently attached to any one. Other enzymes, like a judge in divorce, are occupied in breaking up partnerships that have ceased to be useful.

The mode of action of a chemotherapeutic substance is to attack an enzyme system that is vital to the parasite but relatively unimportant to the host. In short, the function of such a substance is to unite with a component or substrate or product of such an enzyme system and so prevent its normal functioning. Thanks to the work of Woods and Fildes we know how this occurs with sulphanilamide. This drug has a close geometrical, physical and chemical resemblance to *p*-aminobenzoic acid, which is an essential substance for the metabolism of practically all pathological bacteria. In the course of its functioning in the bacterial economy, *p*-aminobenzoic acid has to undergo a transformation by a particular enzyme, becoming attached to it, changed and finally detached from it. Sulphanilamide is so similar to this substance that the enzyme is fooled into accepting the drug in its place. Similar, however, as the drug may be, it is sufficiently different to resist enzymic attempts to change or displace it, and so it remains like a spanner in the works, preventing the functioning of this enzyme unit and disorganizing the life processes of the bacterium. The latter is finally so weakened that it fails to reproduce and is a ready prey to the natural defence forces of the host.

New as this conception applied to bacteria may be, we have known since 1920 that arsenicals act on trypanosomes and spirochetes in an essentially similar way (actually by combining with essential sulphur-containing substances in vital enzyme systems), and there is little doubt that this is a general mechanism by means of which a great many physiological drugs act, even eserine and ephedrine.

In order to visualize more precisely the place of kationic antibacterials in chemotherapy, it is helpful to make a general survey of antiseptic substances. This has been

done in Table I. Careful perusal of this table shows that kationics form a large class with several subgroups that have distinct spheres of usefulness. They all have one feature in common: they are all salts of bases of high molecular weight (molecular range, 150 to 300) and are usually marketed as hydrochlorides or sulphates. In the majority of cases they form neutral solutions in water, and several members are highly coloured, being in fact typical basic dyes. There is, however, no connexion between colour and antiseptic activity in this or any other series.

Kationics act by combining with essential acidic groups in bacteria. The kation (or basic portion) of the antiseptic apparently combines with an anion (or acidic portion) in the bacterium to form a non-ionized complex. This reaction immobilizes these vital anions, which would appear from McIlwain's work to be those of nucleic acids. When we realize that streptococci contain 20% of their dry weight of nucleic acid, we perceive that kationics can effect a chemotherapy that is comparable with the sulpha drugs and superior to all other known antiseptics except penicillin. As far as penicillin goes, there is nothing at present that can surpass it in its action against all cocci and in its low toxicity to mammals. At the same time two disadvantages must be borne in mind. The first is that penicillin is exceptionally costly to produce—it has been compared with radium in this respect—and in spite of a world-wide attack by teams of chemists no clue that would lead to its synthesis has yet been published; the second is that even if we had a free supply of penicillin, it would still be inactive against many Gram-negative organisms. The sulpha drugs, on the contrary, are active against a wide variety of organisms, but are inactivated by the *p*-aminobenzoic acid that is so abundant in pus. The time to use sulpha drugs in wounds is obviously early—that is, as prophylactics before the products of tissue breakdown have had time to accumulate. It is also most important with sulpha drugs to use them, not only early, but in high concentration, so as to avoid breeding sulpha-resistant bacteria.

TABLE I.  
Classification of Antiseptics.

Class.	Mode of Action.	Examples.	Rational Employment.
1. Sulpha drugs	Displace <i>p</i> -aminobenzoic acid from vital enzyme systems.	Sulphanilamide, sulphadiazine, sulphaguanidine, promin.	All are used internally. Sulphanilamide alone, or mixed with sulphathiazole, is used in wounds, but not if pus is present.
2. Kationics	Combine with essential acidic groups in vital enzyme systems.	Proflavine, 5 - aminoacridine, 2 : 7-diaminoacridine. Acriflavine, brilliant green. Crystal violet. Propamidine. "Zephiran", "C.T.A.B.", "Phemerol".	Chemotherapy of wounds with gross sepsis. Prophylaxis of gas gangrene. Brain surgery. Passing out of use on account of toxicity. As a protein-precipitant (burns). As occasional application to wounds infected with staphylococci. Wounds free of Gram-negative strains. Sterilization of intact skin. Sterilization of instruments. Rapid cleansing of dirty wounds.
3. Anionics	Combine with basic groups in vital enzyme systems.	Mandelates, soaps, acid dyes.	Active only in acid-media, so that use of mandelates in acidified urine is the only reliable application of anionics.
4. Phenols	Combine with succinate dehydrogenase and other enzymes essential to parasite and host.	Phenol, cresol (as in "Lysol"), chloroxylenol (as in "Dettol").	Sterilization of excreta, instruments, appliances, intact skin. Chloroxylenol is the least caustic of these phenols but the most affected by protein, and the most selective against particular organisms.
5. Mercurials	Combine with thiol (-SH) groups in vital enzyme systems.	Mercury biniodide, phenyl mercuric nitrate and other organic mercurials.	Few legitimate applications, as rather corrosive and irritating. Inactivated by tissue-repair substances in wounds. Most frequent uses: pre-operative skin-preparation, as fungicides and spermicides.
6. Chelators	Act by combining with divalent metals in vital enzyme systems.	"Chinosol", "Quinolol".	Active only against Gram-positive organisms, but deserve further investigation as a class.
7. Mould products	Unknown.	Penicillin, gramicidin, tyrothricin, citrinin.	Penicillin is the only example that has yet given worthwhile clinical results. It combines very low toxicity with high activity against Gram-positive organisms, but is unlikely to be generally available for some years.
8. Amine-attacking agents	Chlorinate (et cetera) protein.	Eusol, iodine, Dakin's solution, formaldehyde, nitrous acid.	Rapidly inactivated by protein, so must be constantly renewed to be effective in wounds. Are harmful in excess.
9. Oxidizing agents	Oxidize all structures.	Peroxides, permanganates.	Used as "flash" antiseptics; repeated application is harmful.





Actually, the low toxicity of proflavine was rediscovered in 1936 by a team in which I was working, and has since been emphasized by Garrod. Next, Russell and Falconer, at Oxford, showed that a 1:1,000 buffered solution of proflavine was almost as harmless to the brain as normal saline solution, whilst acriflavine caused widespread necrosis, and in 1941 they reported six cases in which compound fracture and gunshot wounds of the skull had been treated by proflavine with great success. They have since reported on the harmlessness to brain tissue of similar solutions of 5-aminoacridine and 2:7-diaminoacridine. Proflavine is at present marketed in Australia only in the form of the pharmacopœial salt, which is described in "The Fourth Addendum to the British Pharmacopœia" (1941) under the name of proflavine sulphate. This substance is really the bisulphate or acid sulphate and corresponds to the bisulphate of quinine in acidity. Our team here has investigated this acidity, and we find that a 1:1,000 solution has a pH of 2.5, a 1:300 has a pH of 2.0, and so on. Such concentrations of acidity are irritant, and if repeatedly renewed cannot but cause some tissue damage. Whilst every endeavour should be made to have a neutral salt of proflavine (such as the neutral

sulpha drugs. In addition, McIntosh and Selbie recently showed that they are more active than sulpha drugs against *Clostridium welchii*.

Our team has developed two new aminoacridines that have some points of superiority over proflavine. These are 2:7-diaminoacridine and 5-aminoacridine. The first of these is being made in England by Glaxo Laboratories, Limited, under licence from the University of Sydney, to which we presented the patent rights—the first medical patent ever to be controlled by an Australian university. It is regrettable that the material required for the synthesis of this red compound is not available in Australia, since it is rather more active and even less toxic than the other members of this family. Our other chemotherapeutic substance, 5-aminoacridine, has much the same biological activity as proflavine, but has two advantages: firstly, it is marketed as the neutral hydrochloride so that its pH requires no adjustment at the time of dispensing, and secondly, it stains neither skin nor clothing—a fact that should result in its being applied more conscientiously than has been the case with the coloured aminoacridines. We published our synthesis of 5-aminoacridine, so that no question of patent rights arises

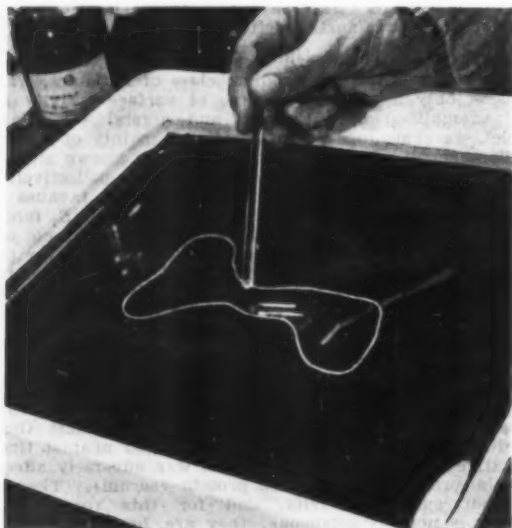


FIGURE I.

Surface activity. A drop of a surface-active substance is falling on the surface of water.

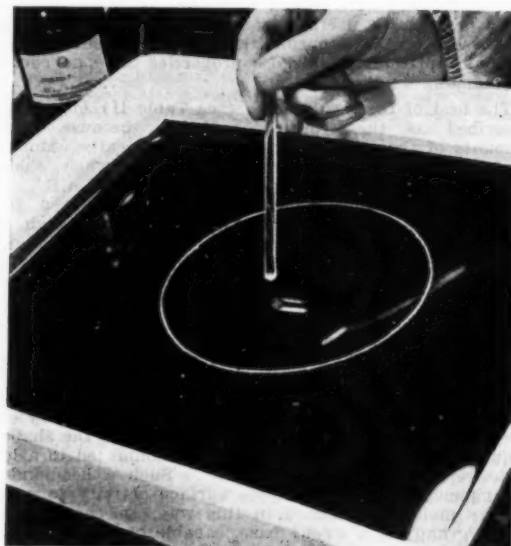


FIGURE II.

A moment later the drop has touched the water inside the cotton loop, thus reducing the surface tension of the included area. Hence the unreduced surface tension outside the loop has pulled it open.

hydrochloride) adopted by the pharmacopœia, there is no need to be inconvenienced by the present material. By adding to any prescription calling for "proflavine sulphate" exactly one-quarter of its weight of sodium bicarbonate and giving the instructions "warm to dissolve", the prescriber can always ensure that a supply of neutral proflavine sulphate will reach the patient (see also this journal, July 31, 1943, page 97).

In using acridine compounds it is important to remember that weight for weight they are many times more potent than sulpha drugs, and for this reason must never be put as powders into fresh wounds. It will be recalled that proflavine powder was used by Mitchell and Buttle in cases of chronic suppurating wounds, in which a granulation barrier would exit. They used the powder sparingly and seldom.

The great virtue of all the aminoacridines is that they are not inactivated by *p*-aminobenzoic acid and hence function well in the presence of pus, whereas sulpha drugs are inactivated under these conditions. Moreover, they are active against organisms which have become resistant to

in this case. It is being made in England by Glaxo Laboratories, Limited, and in Australia by Bayer Pharma Proprietary Limited, the latter company using the trade name of "Monacrin" to describe its product.

As will be seen from its structural formula given earlier, 5-aminoacridine is the nuclear portion of the molecule of "Atebrin", which is very much in the news these days as the antimalarial that has successfully taken the place of quinine since supplies of the latter were largely cut off by the fall of Java in 1942.

The last normal kationic listed in Table II, "Propamidine", is diamidino-diphenoxy-propaine. It was introduced as a wound antiseptic by Thrower last year. The table shows that it has an extraordinary activity against streptococci, but is correspondingly poorer against other organisms. It seems hardly likely to achieve the all-round usefulness of the aminoacridines.

## Reports of Cases.

### A CASE OF PNEUMONIA IN LATE PREGNANCY.

By GEOFFREY HALL, M.B., B.S.,  
Cunderdin, Western  
Australia.

THE following case involving the successful outcome of a confinement at the height of an attack of acute lobar pneumonia must be of sufficient rarity and interest to warrant report.

#### Clinical Record.

Mrs. J.B., aged twenty-three years, was expecting her fifth baby on November 20, 1943. Her previous confinements so far as was known were normal. The care of the patient during this pregnancy had involved the removal of all her teeth under ether anaesthesia at the third month for a severe chronic Vincent's angina infection, which was diagnosed bacteriologically. Her gums healed rapidly, and by the fifth month of pregnancy her mouth was free of all abnormality.

Nothing further of note occurred until October 17, 1943, when I was called in and found the patient acutely ill. She gave a twenty-four hour history of cough, high temperature, shivering and sweating and vague pain in the chest. On examination, she was obviously very ill; her temperature was 104° F., her pulse rate was 120 per minute, and her respirations numbered 30 per minute. The tongue was furred and the throat was dry and injected. The only abnormality detected in the chest was puerile breathing with a prolonged expiratory sound anteriorly at the apex of the right lung. In view of the typical history and this sign, a diagnosis of right apical pneumonia was made.

At this time the uterus was to the height of an eight months' pregnancy, and the fetal heart was heard at the rate of 150 beats per minute.

The patient arrived in hospital at 4 p.m. on October 17 and was immediately given three 0.5 gramme tablets of "M & B 693". The administration of these was continued at the rate of two every four hours for seventy-two hours, two every eight hours for two days, and one every eight hours for two days, the course being finished at 10 a.m. on October 24; 57 tablets had been given in all. The usual nursing treatment for pneumonia was instituted. Morphine (one-sixth of a grain) was given every four hours to relieve pain, and also in the hope of preventing the onset of labour.

At 8 a.m. on October 18 the patient began to have regular abdominal pains at intervals of twenty minutes, and when I saw her at 10 a.m. she was obviously in labour, for hardening of the uterus could be felt during a pain. By this time she was desperately ill, being obviously dyspnoeic, cyanosed and apathetic; she was vomiting, and coughing up copious quantities of purulent, rusty sputum typical of lobar pneumonia. On examination of the chest, the signs at the apex of the right lung were the same as on the previous day; but over the lower lobe of the left lung posteriorly tubular breathing and multiple medium inspiratory râles were heard. The puerile breathing was thus a false localizing sign, and the correct diagnosis of left lower lobe pneumonia was made. Incidentally, the puerile breathing disappeared during convalescence.

In view of the onset of labour, and especially because of a previous history of short labours, the seriousness of the prognosis was immediately conveyed to the husband. The text-book statement that the maternal mortality rate was 50% when the onset of labour complicated pneumonia did not increase the morale of doctor and nurses. Our hope seemed to lie in the production of an "M & B" crisis before delivery of the child, because in the patient's present state it was felt that heart failure would be almost certain to follow delivery, especially if general anaesthesia was to be used. Ether was contraindicated, nitrous oxide was unobtainable and chloroform with its reputation for sudden heart failures was viewed with disfavour.

The only hope of delaying labour seemed to be to push the morphine, despite the fact that 0.5 grain in sixteen hours had not prevented its onset. On the other hand, in view of the very moist condition of the lungs and the profuse

sputum, one could appreciate the danger that too much morphine might abolish the cough reflex and produce a pool of sputum in the lungs, which could result in disaster. It was therefore decided to take a middle course and to use moderate doses of morphine, and as events turned out, this seemed to be the correct procedure.

During the twenty-four hours following 10 a.m. on October 18, a gradual improvement occurred in the patient's condition; the vomiting ceased, her respirations became less distressed, the temperature fell gradually, and in fact she went through a typical "M & B" crisis. The temperature fell before the pulse rate, and the cyanosis increased in keeping with a rising "M & B" concentration in the blood. The labour progressed slowly but surely, consisting of moderate first-stage contractions every twenty to thirty minutes. By mid-day of October 19 she was still having contractions. Her condition was so much improved that it was thought wise to perform a vaginal examination to determine the exact progress of labour. This was made under strict aseptic precautions. Incidentally, throughout the whole illness both the staff and the patient wore masks during nursing procedures. Vaginal examination at 3 p.m. revealed, to my surprise, that the cervix was fully dilated and taken up; the membranes were intact and bulging, and the head was well down in the mid-pelvis. At this time movements were noted by the patient and the fetal heart was beating regularly at the rate of 150 beats per minute. The signs in the chest had by this time changed. At the base of the left lung a flat, dull percussion note was detected and the breath sounds were completely absent. A pleural effusion was therefore diagnosed.

At this stage another difficult problem presented itself: was an empyema developing? If so, it would be wise to rupture the membranes, apply forceps and extract the child before the mother again became acutely ill. In view of the early appearance of the fluid during the first few days of the pneumonia, and the excellent response to "M & B 693", the diagnosis was made of a sterile pleural effusion, such as often accompanies lobar pneumonia, and conservative treatment was adopted.

The strangest feature of the whole case now occurred. The labour pains, which had been decreasing in severity, ceased completely at about 4 p.m. on October 19, soon after the vaginal examination, and the uterine condition remained completely stationary for two and a half days until 8 a.m. on October 22. During this time the clinical condition of the patient returned to normal; the pulse rate returned to 80 beats per minute and the respirations to 22 per minute, and the temperature remained below normal. She began to eat, the thick fur on her tongue gradually disappeared, and the pleural effusion was gradually absorbed. On October 21 distant breath sounds were heard, and on October 22 râles and normal breath sounds were heard at the base of the left lung. The only clinical signs departing from normal were the râles and the persistence of an obvious "M & B" cyanosis.

At 8 a.m. on October 22, when routine sponging of the patient was taking place, the bag of membranes was noticed outside the vulva. By the time I arrived at the hospital, second-stage contractions were occurring, and before I had finished "scrubbing up" the head was on the perineum, the membranes still being unruptured. At 9 a.m. a live female infant weighing six pounds eleven ounces was delivered. The mother was given only a few drops of chloroform, so that she was in the obstetrical plane of anaesthesia only during the passage of the head over the perineum. She was awake before the cord was tied. The baby cried lustily from the outset, and was a normal pink colour, in contrast with her mother, who was still distinctly cyanosed. Incidentally, the baby was born completely enveloped in membranes, and if it had not been for the fact that the membranes were snipped during preparation of the vulva, in order to get the bag of fluid out of the way, she would have been truly "born in the caul".

The mother had a shivering attack after removal of the placenta. The convalescence was otherwise uneventful. The mother and baby were discharged from hospital, both well, on November 7. The baby weighed six pounds ten ounces at that time and was gaining in weight.

#### Comment.

The great value of the sulphonamide group of drugs in pneumonia complicated by the onset of labour is shown in this case. The early "M & B" crisis leaves the patient within forty-eight hours in a fit state to have a baby. The



mortality rate must have been reduced from 50% to single figures by the introduction of these drugs.

Morphine runs a close second as a valuable drug, because, although in this case it did not stop labour from proceeding, it slowed down the process, so that the patient had regular contractions for thirty-six hours, and was eventually delivered four days after the onset, when her normal labour time was in the vicinity of six to seven hours. At the same time, it must be admitted that the toxicity of the pneumonia may have aided in delaying the progress of labour.

The remarkable tenacity of the membranes in this case was helpful, because so long as the membranes were unruptured the baby remained safe, and conservative treatment was justifiable.

The observation that the baby was not cyanosed at birth, in contrast to the mother, suggests that drugs of the sulphonamide group are not absorbed in any quantities into the fetal circulation. Other opinions on this point would be interesting.

A sufficient absorption of "M & B 693" occurred, as was evidenced by the crisis and cyanosis. Information has been accumulated to suggest that the sulphonamide drugs are not satisfactorily absorbed during labour, and that they should therefore be given parenterally. This case shows that at least in some instances absorption does take place.

#### Acknowledgements.

My thanks are due to Flight-Lieutenant M. Zilko for his helpful advice, and also to the matron and nursing staff of Cunderdin Hospital for their efficient nursing treatment, which is still so important in the management of pneumonia.

### Reviews.

#### SURGICAL TREATMENT.

THE good reputation of Scottish surgeons will be enhanced by the publication of "Textbook of Surgical Treatment Including Operative Surgery", edited by C. F. W. Illingworth, of Glasgow.<sup>1</sup> There are eighteen contributors. At the outset we may state that the book is sound and is on the whole a good epitome of modern surgical treatment. It should be in the hands of all surgeons, house surgeons and senior students.

The book consists of thirty-seven chapters, each of which deals with the affections of some region or organ. In one or two instances the division is somewhat unusual. For example, in one chapter devoted to affections of the bladder and urethra, prostatic conditions and urethral conditions such as stricture are mentioned. The next chapter deals with affections of the male genital tract, and here tumours of the testis, epispadias, epithelioma of the penis and so on are discussed. The two chapters are by different contributors. It will be impossible to refer to all the chapters in this book; we propose therefore to draw attention only to some features which should be emphasized or to which exception may be taken.

The precept in the preface that surgical treatment implies much more than the performance of a surgical operation is one that should underlie all surgical teaching. The terms surgeon and operator are not synonymous.

In the chapter on burns emphasis might have been laid on the risk of increasing shock by the use of over-zealous cleansing methods. For a Scot, the author of the chapter on amputations is singularly unenthusiastic about Syme's amputation. In the chapter on blood vessels which is thorough the value of digital pressure for the temporary control of hæmorrhage is not mentioned. In the discussion on infection of joints it is stated on page 146: "If the joint contains frank pus at the first aspiration, or . . . if the fluid becomes purulent, then arthrotomy is essential." With

this we cannot possibly agree. On page 338 it is stated in the last paragraph in regard to the dissection of the digastric triangle for malignant glands that care must be taken not to wound the external maxillary artery as it crosses the mandible. We know that all surgeons of experience ligate this artery above the posterior belly of the digastric muscle and again on the mandible. On page 413 in the discussion on gastro-jejunostomy the operation of anterior gastro-jejunostomy is stated to have been superseded by the posterior method. This is generally true, but the author should have pointed out that sometimes the anterior method only is available, and that when it is used entero-enterostomy should also be performed between the proximal and distal loops of the jejunum. On page 423 in the last paragraph a method of partial gastrectomy is being described: "The first part of the duodenum is freed from its attachments, divided, and the stump invaginated. On its upper aspect, the right free border of the lesser omentum must be divided and the right gastric artery ligated. . . ." The author does not mean this, because the border of the lesser omentum forms the boundary of the entrance to the lesser sac and contains in its folds the bile duct, the hepatic artery and the portal vein. Some correction should be made. In regard to intussusception and its treatment by the rectal injection of fluid, it is stated on page 436 that "barium should be slowly run into the rectum through a tube . . ." Clearly this should be "an emulsion of barium sulphate". It should, however, be pointed out that Hipsley, who has perfected this treatment, does not find the use of an opaque enema necessary. On page 470 in regard to the technique of the interval operation for removal of the appendix we read: "An oblique muscle cutting incision is not used as a formal incision for the interval operation, but is valuable as a modification of the grid-iron incision when the accession proves inadequate." Muscle-cutting surgery would in our opinion be very bad surgery. In the circumstances named it is quite easy to separate the fibres at another level and then to prolong the incision in the peritoneum. On page 498 the word "macroscopic" in the third paragraph should be "microscopic". We think that unwarranted optimism is shown by the author who writes: "Since tumours of the testis metastasise early, especially to the lumbar glands, early treatment is necessary to achieve cure."

The work is well arranged, clearly printed and well bound; it is a credit to the publishers and to Britain in wartime. We should like to see a bibliography at the end of each chapter, but this will be a matter of opinion.

### Notes on Books, Current Journals and New Appliances.

#### TRAINING FOR CHILDBIRTH.

A LITTLE over three years ago a good deal of space was given in these columns to a review of Sister M. Randell's book "Training for Childbirth". The book was commended as providing an up-to-date course of physical education for prospective mothers. The book is claimed to be written from the mother's point of view, and it will, if used properly, train her "to perform all her natural functions during the pre-natal, intra-natal and post-natal stages". The third edition has now appeared, and we bid it welcome; evidently the work is appreciated. This edition is somewhat smaller than the first edition because of the need to economize in the use of paper. The material excluded, however, is part of the introductory matter. The number of illustrations has been increased from 118 to 128. In the preface Dr. J. S. Fairbairn is quoted as regarding the prenatal exercises and postures in the book in much the same light as the drill of a soldier. "They are a discipline in the power of control under stress which, if once attained, will give that confidence that is half the battle." This edition may be recommended with as much confidence as was shown for the first.

<sup>1</sup> "Textbook of Surgical Treatment Including Operative Surgery", edited by C. F. W. Illingworth, M.D., Ch.M., F.R.C.S.E.; 1943. Edinburgh: E. and S. Livingstone. 10" x 6½", pp. 540, with many illustrations. Price: 28s. net.

<sup>2</sup> "Training for Childbirth: From the Mother's Point of View", by Minnie Randell, S.R.N., S.C.M., T.M.M.G.; Third Edition; 1943. London: J. and A. Churchill, Limited. 8½" x 6½", pp. 131, with 128 illustrations. Price: 10s. 6d.

## The Medical Journal of Australia

SATURDAY, MARCH 18, 1944.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

### MEDICINE AND ENGINEERING.

THE Bradshaw Lecture delivered before the Royal College of Surgeons of England on November 11 of last year and published in the *British Medical Journal* of December 11, had as its title "Physics and the Surgeon", and the lecturer, Mr. H. S. Souttar, of London Hospital, made a plea for further collaboration between "two branches of science which may at first seem to have little in common" and expressed the hope that "each may gain from the experience which the other brings". Not so many years ago the physicist would have treated the claim of surgery to be classified as a science with considerable amusement, but this attitude cannot now be maintained. Mr. Souttar professed to have covered "a very wide field", but in reality his remarks were confined to the action of a few muscles, the transmission of heat through the skin and other tissues and the different forms of radiant energy applicable in diagnosis and treatment. He also described a case of impact on the skull leading to the entry of a mass of mud through a crack in the bone, but missed what was probably the correct explanation, the development of a negative pressure. The field traversed by Mr. Souttar may have appeared wide to his surgical hearers, but if medical science is taken in its full scope it was actually rather small. The medical investigator has borrowed from the physicist, but he has repaid the debt with high interest. Take for instance the measurement of small electric currents. The moving-coil galvanometer which reversed the principle of the Kelvin instrument and is independent of electro-magnetic disturbances in its vicinity is an example; the string galvanometer is another, the interpretation, both mathematical and mechanical, of the records of the capillary galvanometer is another, as also a great improvement in the design of the apparatus. The prevailing method of expressing the concentration of hydrogen

ions comes not from the physical chemist, but from the physiologist. It might be thought that in the eye there is a great opportunity for collaboration with the physicist, but we find that the outstanding problems of vision are concerned with the physiology and pathology of the peripheral and central nervous systems, the circulation and the coordination of muscular action. Superposed on these are psychological factors of great complexity and importance. Nothing could lead more surely to disaster than to treat errors of vision from the standpoint of physics alone.

There have been many investigators of distinction who were equally competent in physics and in physiology pure and applied, and each science has claimed them as disciples; one thinks in this connexion of Thomas Young, Hermann Helmholtz, and in our own day Professor A. V. Hill; but it is rather remarkable that so few engineers have turned their attention to problems of the animal body or conversely that so few biologists have taken up the study of engineering. Many engineers have included in their range and discipline of training a course of law, but very few have adventured into biology, and yet it is here that a large and assuredly fruitful field awaits investigation. Professor Benjamin Moore was trained as an engineer, but abandoned this study for biochemistry, and little trace of his first love appears in his published works. His knowledge of medicine was tenuous and his clinical experience nil. Professor Emmett Rixford, professor of surgery in Leland Stanford University, went through an engineering course before he took up the study of medicine. His applications of engineering to surgical problems were few but elegant, and those who heard him at surgical gatherings will remember his description of fractures of bone produced by bending and torsional stresses and how simply he illustrated these with pieces of ordinary black-board chalk. In 1873 Samuel Houghton published a remarkable book, "Principles of Animal Mechanics", which has remained without a successor. It is true that there are a few sad slips in this treatise; for instance, Houghton ascribed the range of jetting of blood from a cut artery to the velocity and not to the pressure and came to utterly erroneous views regarding the rate of flow; he also gave figures for the force exerted by the parturient uterus which have made a generation of obstetricians smile; nevertheless the work was truly pioneer and he endeavoured to apply to the living animal body what were then some of the latest concepts in physics, such as the principle of least energy. This book has never been revised, nor has its subject matter been studied and expounded in a fitting manner though so good a foundation was laid for further work. In all truth physiology, pathology and surgery could be benefited by research directed from an engineering angle. It would be easy to give numerous examples of problems of living structure awaiting engineering solution. Take as an instance shock absorption. A small boy looking with admiration at an elephant at a circus recently remarked: "Isn't it well sprung?" The movable scapulae with their strong muscular attachments to the sternum are admirably adapted in the quadruped to take up the impact of the falling weight of the animal on the forelegs. In the hind limbs there are the bent stifle and hock, and in the horse the special vascular arrangements of the foot. The erect posture in the human being has limited shock absorption to the arch

of the instep, the rather thin articular cartilages and the elastic pads of the intervertebral disks. It is significant that the skier invariably adopts an attitude with flexed hips and knees. Another example can be found in the rhythmic and reciprocating movements with alternating flexion and extension which make up the bulk of our muscular activities outside the postural. Very early in the development of the high-pressure steam engine it was found necessary by means of the slide valve to have what is termed "lead"; that is, steam is admitted before the end of the stroke in the opposing direction, otherwise the piston might break through the cylinder head. Slow-motion pictures of horses galloping strongly suggest that in the alternating flexion and extension of the legs "lead" is present. Whether "outside lap", that is, the cutting off of power before the end of the stroke, occurs in rhythmic muscular action is another problem not so easily investigated. Some forms of ataxia might well be explained by altered "lead" or "outside lap", if this latter exists. Again engineering science tells us that in the specification of a prime mover there should be included starting effort, best speed, greatest power at that speed, and finally greatest power obtainable and for how long without injury. Until A. V. Hill showed that there is a best speed in pedal action as in cycling, but little attention had been given to this aspect of contractile tissue largely on account of the exceptional adaptability of muscle, for, though most muscles are working at a fixed and a high gear, they can change their power output without evidence of strain. A man strolling along a road is exerting about one-sixteenth horse power; running upstairs he changes suddenly to half horse power; an athletic fireman scampering up a ladder may, as A. V. Hill points out, actually exceed one horse power, and this without change of gear or production of noise or smell.

Approximate uniformity in speed of a machine is obtained by the devices of fly-wheel and governor. Theory tells us that any equilibrium obtained by a self-regulating mechanism must be oscillatory. When the governor is acting well the amplitude of oscillation is small, but if the governor develops lag or becomes otherwise less responsive, the oscillations become major and "hunting" results. A surprisingly large number of adjustments in the animal body are self-regulating, such as the pressure, volume and reaction of the blood, the ventilation in the lungs and any directive attitude of a limb or movable part not maintained by an extreme position of a joint. Cheyne-Stokes respiration and nystagmus are typical "hunting" manifestations, and the wonder is that more have not been discovered.

Resonance effects have been hinted at as possibly present in heart action where economy of energy is carried to an amazing degree. There is still much to be learned concerning the structure of bone with its interlocking systems of concentric hollow cylinders and its internal struts. Pre-heating and de-dusting explain the convoluted surface and the high vascularization of the nasal passages. There is indeed a wonderful scope for a book on human anatomy and one on physiology written with an engineering approach, but unfortunately anatomists hitherto have been morphologists; and physiologists, whilst they have acknowledged their indebtedness to physics, have rarely used an engineering approach. But "*mellonta tauta*" as Sophocles has it . . . these things are of the future.

## Current Comment.

### ELLIPTOCYTOSIS ASSOCIATED WITH HEREDITARY HÆMORRHAGIC TELANGIECTASIA.

In 1932 Garnett Cheney drew attention to the occurrence of abnormal shapes of erythrocytes in association with an anæmia indicative of some disease affecting the hæmopoietic system.<sup>1</sup> He laid stress on the hereditary nature of the condition by a report on forty-one members of a family in three generations, fourteen of whom manifested elliptical erythrocytes. He stated that transmission was probably by a simple Mendelian dominant. He held that although the condition had an association with secondary anæmia and with sickle cell anæmia, there was nothing to justify such a relationship, and apart from the unusual shape of the erythrocytes, he could find nothing else remarkable in studies of the blood or of the bone marrow. His conclusion was that the elliptical erythrocytes were not in themselves indicative of disease, but were an inherited characteristic. Cheney stated that the condition was first reported by Dresbach in 1904 and that when he wrote he could find in the literature only seven references to the condition. One of these references was by H. Bernhardt, who in 1928 described a case in which the patient, in addition to the abnormal shape of erythrocytes, manifested a secondary anæmia and a "shift to the left", but no other abnormal blood condition.<sup>2</sup> Another was by A. H. van den Bergh who, also in 1928, reported a case<sup>3</sup> in which hæmolytic anæmia was present, splenectomy was performed and the jaundice disappeared. Since Cheney wrote many other references to this subject have appeared in the literature. One of the most important articles is by H. Wyandt, P. M. Bancroft and T. O. Winship.<sup>4</sup> These authors, who publish a first rate review of the literature, reported 86 new cases of elliptocytosis in three large families of German extraction. In their review of the literature they covered 246 cases occurring in 64 families. They insisted that a subject had to have at least 25% of red cells of elliptical shape before he could be considered to be a "carrier" of the abnormality; in fourteen of their cases subjected to careful examination the percentage varied from 73 to 96. It is significant to note that in their cases the subjects were "singularly free from any type of anæmia". Only one patient manifested anæmia. The individual family members were "unusually healthy and long lived".

J. B. Penfold and J. M. Lipscomb have reported a family, five of whose members suffered from elliptocytosis.<sup>5</sup> The affected members had signs of hæmolytic icterus without an increase in fragility. The five persons had over 90% of oval red cells in their blood. Though the pedigree is small, these authors point out that the evidence afforded by it is in complete accord with the view that elliptocytosis is inherited according to Mendelian laws as a dominant character. Their cases have, however, an added interest because they were associated with hereditary hæmorrhagic telangiectasia. This condition was described by William Osler in 1907.<sup>6</sup> He named several groups of telangiectasis: (a) A condition on the nose, cheeks and ears known as rosacea; (b) small purplish spots, from two to five millimetres in diameter, perfectly smooth and uniform, without visible venules, which disappear completely on pressure; (c) small nodular forms, raised and a bright crimson or purple colour, varying in size from one to five millimetres; (d) the spider form known as *nævus araneus*; (e) the mat form; (f) the generalized, acquired telangiectases—the *telangiectases essentielles en plaques* of the French; and

<sup>1</sup> *The Journal of the American Medical Association*, Volume XCVIII, March 12, 1932, page 878.

<sup>2</sup> *Deutsche medizinische Wochenschrift*, Volume LIV, June 15, 1928, page 987.

<sup>3</sup> *Deutsche medizinische Wochenschrift*, Volume LIV, July 27, 1928, page 1244.

<sup>4</sup> *Archives of Internal Medicine*, Volume LXVIII, December, 1941, page 1043.

<sup>5</sup> *The Quarterly Journal of Medicine*, Volume XII, July, 1943, page 157.

<sup>6</sup> *The Quarterly Journal of Medicine*, Volume I, 1907-1908, page 63.



(g) the multiple hereditary form with recurring hæmorrhage. Osler described the disease as very serious in that the bleedings were often of great severity and in some cases of such frequent recurrence that chronic anæmia was produced. Osler clearly distinguished this condition from telangiectasis appearing as a secondary condition in diseases of the liver. F. Parkes Weber, writing in 1907,<sup>1</sup> expressed the view that the cutaneous angiomas were "late developmental" rather than hereditary; he used the description "multiple hereditary developmental telangiectases". He held that with advancing years attacks of hæmorrhage and anæmia became more severe and that probably a kind of vicious circle was established—the repeated attacks of bleeding giving rise to a grave condition of anæmia, which in its turn increased the tendency to hæmorrhage. The hereditary nature of bleeding telangiectases of the nasal mucous membrane might, he thought, be compared to the occasional family tendency to suffer from hæmorrhoids or have ordinary varicose veins in the lower extremities. It is to be noted that one of Penfold and Lipscomb's patients, of whom unfortunately full records are not available, died at the age of twenty-five years within twenty-four hours of the onset of a condition which resembled subarachnoid hæmorrhage. Several others suffered from epistaxis.

Penfold and Lipscomb state that the cases described by them are the first in which these two anomalies have been associated. Other defects have been reported in association with elliptocytosis and genetic linkage has been suggested in connexion with them. Penfold and Lipscomb discuss genetic linkage in terms of genes and chromosomes. In regard to elliptocytosis and other defects such as oxycephaly and defects of the lateral incisor teeth, they state that the incidence of linkage is not sufficiently high to warrant the assumption that it is strictly genetic. They think that the association of anomalies in their own cases may well be fortuitous since both are inherited as Mendelian dominants—"in any event no valid conclusion can be drawn from such small numbers". This is probably the safest conclusion that can be drawn. The whole question, admittedly, has an academic rather than a practical appeal and it does present opportunities for interesting speculation. For example, Penfold and Lipscomb refer to the incidence of signs of abnormal hæmolysis which in all cases of elliptocytosis has been in the neighbourhood of 12%. They think that the accumulated evidence strongly supports Mason's postulate of elliptocytosis as an oval cell trait in which there are liable to occur phases of what might be termed "hæmolytic elliptocytic anæmia". In one of their cases polycythæmia was present and they put together an ingenious explanation of its occurrence. Their final statement is that while they have brought forward evidence to show that elliptocytosis can and does cause hæmolytic anæmia, the nature of the mechanism is unknown and it is only possible to postulate that the oval cells are destroyed by virtue of their age or of their essential morphological abnormality.

#### AN EXPERIMENT IN THE CONTROL OF TUBERCULOSIS.

Though there are probably quite a few communities whose environment and general character make an attempt at the complete control of tuberculosis a relatively simple matter, it would be safe to contend that in few of them have the authorities sufficient imagination and energy to put their ideas into practice. Prominence should therefore be given to an account of what is called an experiment in tuberculosis control that was carried out at the small town of Geraldton in the Province of Ontario, Canada.<sup>2</sup> This town is situated in a gold-mining district, it is built around the Canadian National Railways track and is isolated from the rest of civilization by 190 miles. The population of the town is 2,500, but this total is somewhat below the normal level on account of the demands of war. The town has a modern thirty-five bed

hospital which was built for community service by the cooperation of all the mining companies. The institution is financed chiefly by the mining companies, but it also receives fees from patients, as well as a small grant from the town of Geraldton for the care of its indigent patients. "It is a 'private' hospital in its incorporation, but public in every other sense." In Ontario every miner employed in an occupation that exposes him to dust, is required by law to undergo a physical examination, including an X-ray examination of the chest, to determine whether he is physically fit for such exposure. J. A. Riches, who reports this "experiment", points out that, through the cooperation of the Workmen's Compensation Board, all men employed in other occupations, not connected with dust, are subjected to an X-ray examination of the chest at the time of employment. By this means it is held that exposure of miners to a case of open tuberculosis is kept to a minimum. In all matters of this kind there are two points of view. One is the cold and calculating attitude commonly attributed to soulless groups of employers, but we believe gradually becoming less, that is concerned only with the large turn-over of a thriving industry, in the case of Geraldton the winning of gold from the earth. The other is the attitude of the hygienist who demands that the health of the worker shall be safeguarded and that if necessary industrial processes shall be modified to secure the maintenance of health. It cannot be stated too often that the industrial doctor, the industrial expert in preventive medicine, should seek the objective of the hygienist first and foremost and make every other consideration subservient to it. Realizing this, we can agree with Riches when he refers to the fact that miners with silicosis complicated by tuberculosis become disabled early and are a charge on industry, but adds that the most important factor is the unnecessary suffering of disabled persons and not the economic factor.

With the object of discovering all sufferers from tuberculosis in the community and subjecting them to treatment, in hospital if necessary, it was decided that all adults in the district who were not employed in the mines should be examined with X rays. The mine employees had already been examined and children at the schools had been tested with tuberculin and all who reacted had had an X-ray examination. The work was done free of charge at the hospital with the cooperation of the Division of Tuberculosis Prevention, Ontario Department of Health, and of the Geraldton Branch of the Canadian Red Cross Society. During a period of three weeks in September and October, 1942, X-ray examinations of the chest were made. Altogether 1,552 films were taken at a cost of fifty cents each. The results may be stated as follows. Approximately 1,100 mine workers are examined annually by the Workmen's Compensation Board. Of 431 children tested with tuberculin, 128 gave a positive reaction and were given an X-ray examination. The total number of persons examined with X rays was 1,429. Of these, 1,371 or 95.9% had no disease. The number with active tuberculosis was 26 or 1.8%. Of the 26 persons, three suffered from active tuberculosis and were sent to a sanatorium; 23 had arrested or healed disease. Four persons were regarded as suspected and were marked for reexamination. Twenty-eight persons were found to be suffering from non-tuberculous conditions. Of the 26 cases of tuberculosis discovered by the survey, no less than twenty were previously unknown. One useful feature of the survey was that it revealed other pathological conditions ranging from possible cancerous growths to enlarged hearts, aneurysm and so on. Riches states that he does not see why a similar kind of survey should not be made in any community; all people with a knowledge of preventive medicine will agree with him.

#### THE HALF-YEARLY INDEX.

THE INDEX TO THE MEDICAL JOURNAL OF AUSTRALIA, Volume II, 1943, is in the press and will be sent shortly to those who usually receive it. Others desiring a copy should write to the manager at the Printing House, Seamer Street, Glebe, New South Wales.

<sup>1</sup> *The Lancet*, June 20, 1907, page 160.

<sup>2</sup> *Canadian Journal of Public Health*, October, 1943.

## Abstracts from Medical Literature.

### MEDICINE.

#### Xanthomatosis.

H. ENGELBERG AND B. A. NEWMAN (*The Journal of the American Medical Association*, August 21, 1943) have described six cases of xanthomatosis and coronary artery disease seen during the last two years. The ages of the patients were between thirty-one and forty-eight years. Xanthoma of the skin of the eyelids, increased blood cholesterol content up to 430 milligrammes per centum and coronary occlusion were noted. The yellow tumours of xanthoma were also present in other situations in the body, about the elbows, the tendons of the wrist and the tendo Achillis. In four cases there was a familial tendency to xanthoma. Three males and three females were included in this series. Electrocardiograms in all cases showed evidence of coronary sclerosis and occlusion. Treatment consisted in the administration of a diet with a low cholesterol content. In these cases other members of the family should be examined for xanthochromatosis, and dieted if necessary. The course of the coronary lesions was similar to that of other coronary disease.

#### Drug Therapy in Heart Disease.

STUART U. PAGE (*The Canadian Medical Association Journal*, September, 1943) discusses the indications for drug therapy in heart disease under the headings of (a) digitalis type drugs and quinidine, (b) diuretics, (c) vasodilators, (d) opiates. The use of digitalis is now largely restricted to congestive heart failure irrespective of rhythm or aetiology, but it is often inefficient and fails completely in some cases. Its value is most strikingly exemplified in heart failure with auricular fibrillation particularly of rheumatic type, but its efficiency, though less uniform and less predictable, is also recognized in heart failure with normal sinus rhythm. Digitalis is not usually indicated in mitral stenosis unless auricular fibrillation or signs of right ventricular failure are present. The presence of auricular fibrillation is not in itself an immediate indication for digitalis therapy, and this is often true in old people with a heart somewhere within normal limits, especially if there are no subjective symptoms or objective findings of cardiac insufficiency. Digitalis is not necessary in paroxysmal fibrillation unless the attack persists or passive congestion results. The rate does not respond so well and there is a danger of digitalis intoxication if the drug is pushed in cases of auricular fibrillation of thyrotoxicosis. In thyrotoxicosis, the ventricular rate is usually found to respond when the activity of the primary disease is reduced as a result of treatment. Digitalis is not important in the treatment of rheumatic heart disease of children, for fibrillation is uncommon, and infection of the heart, if present, renders the drug of little value in the acute stage. Digitalis is used to control the rapid ventricular rate of auricular fibrillation in the

absence of heart failure, and to reduce the number of premature ventricular contractions when they are troublesome. The drug also affords relief in paroxysmal cardiac dyspnoea, especially when signs of failure are limited to the pulmonary system. In the early stage of cardiac infarction, digitalis is not only useless, but it may be harmful, perhaps promoting the onset of ventricular fibrillation, whereas it may be used with benefit if congestive heart failure develops particularly if auricular fibrillation complicates the picture. Diversity of opinion exists about the harmful effects of digitalis in *angina pectoris*, it being claimed by some that coronary artery constriction results from its use. The author states that the drug should not be used for simple tachycardia, for the tachycardia of hæmorrhage, or in cases of peripheral circulatory failure when heart failure is not present; it is advantageously used in the treatment of patients with diminished cardiac reserve who have previously suffered from failure even though they remain symptomless. The author is of the opinion that there is insufficient proof at present that any of the digitalis substitutes or purified factors are more valuable than the standard leaf. The field for quinidine therapy has widened in recent years, but there is still variance of opinion regarding the advisability of attempting to establish normal rhythm with quinidine in cases of auricular fibrillation. If it is used it is common for auricular flutter to develop, and it may continue permanently or revert to auricular fibrillation or normal sinus rhythm. Quinidine has a special field in young persons with idiopathic auricular fibrillation without other evidence of heart disease, the best results being achieved when fibrillation has not lasted for more than a month. Quinidine should also be given when auricular fibrillation is caused by hyperthyroidism, and is not associated with organic heart disease, and continues for several weeks after thyroidectomy. It is also of value in paroxysmal auricular tachycardia and atricular extrasystoles, and it has been used in cardiac infarction to prevent the onset of ventricular tachycardia and ventricular fibrillation. The drug is contraindicated when there is a history of embolism, when there is extensive myocarditis, when there is an idiosyncrasy to quinine, and in partial or complete heart block. The use of diuretic drugs such as the purine derivatives, mercury and certain salts is indicated in congestive failure when œdema and dyspnoea persist after a regimen of digitalization and rest with restriction of fluid and salt intake. Diuretics are most effective with normal or relatively normal kidneys, and they are more effective after the patient has been digitalized than before. Theophylline derivatives including aminophyllin are the most efficient diuretics, but are more toxic than the theobromine derivatives. In hypertensive heart disease with failure the gross signs are often rapidly relieved, and used prophylactically in these cases in occasional dosages, a mercurial may prevent recurrence of symptoms for long periods. The author states that albuminuria is not a contraindication for mercurials, but that increasing albumin and the presence of casts or red blood cells in the urine are danger signals. Opinion varies as to the

dosage of opiates in acute cardiac infarction, some advising a large dose of half a grain of morphine immediately, others claiming that smaller doses are safer and advising just enough morphine to dull the pain and relieve breathlessness if present. The author advises an initial dose of a quarter of a grain of morphine, which is repeated with a one-sixth or one-quarter grain dose. In paroxysmal cardiac dyspnoea, morphine sulphate in doses of one-sixth to one-quarter grain depresses the respiratory centre, allays anxiety and restlessness, aids in relief of dyspnoea and cough, and lowers the blood pressure. The author gives a warning, however, that in cases with asthmatic type respiration, morphine given in large doses may help to precipitate acute œdema of the lungs through diminution of the respiratory effort, and that in the presence of acute pulmonary œdema large doses of morphine may prove fatal through too marked a depression of the respiratory centre and consequent inability to cough up the copious fluid.

#### Petit Mal.

J. C. PRICE, H. WAELSCH AND J. PUTNAM (*The Journal of the American Medical Association*, August 21, 1943) have discussed the treatment of *petit mal* and psychomotor seizures with *di-glutamic acid hydrochloride*. Four grammes of this drug were given thrice daily to patients with slow wave activity in the electroencephalogram. The morning urine was subjected to nitrazine paper tests to find the acidity, which was maintained at pH 5. Eight patients with attacks of *petit mal* varying between one to fifty per day were treated. The attacks were reduced in frequency, and the patients were more alert and brighter. Other drugs were often used at the same time, such as ammonium chloride, which was ineffective, phenobarbital and phenytoin sodium, and their action was often enhanced by the new drug. Psychomotor seizures were also benefited and the mental state improved when *di-glutamic acid hydrochloride* was given. *Grand mal* was not lessened. In one case severe gastric distress resulted from the use of the drug; acute pain and vomiting occurred and no other ill effects were noted.

#### Pulmonary Embolism due to Quiet Venous Thrombosis.

JOHN HOMANS (*The New England Journal of Medicine*, August 19, 1943) states that pulmonary embolism is often caused by quiet thrombosis in the legs, and that it may recur again and again or may prove fatal before any signs of thrombosis appear. Embolism from such a thrombosis is more apt to cause repeated pulmonary infarction without fatality than that which complicates operation, accident or illness. Quiet thrombosis, or so-called "phlebothrombosis", is a non-inflammatory, reactionless process, most commonly seen in the sixth and seventh decades and in fat or fattish patients, but it may occur at any age from adolescence to senescence. A fatal pulmonary accident may come from a leg that even those most familiar with venous thrombosis must consider normal, and by contrast, the great swollen leg of thrombophlebitis almost never causes embolism. The thrombosis may follow one of three

courses: recovery without extension, development into *phlegmasia alba dolens* and the formation of a propagating thrombus with pulmonary embolism. Electrocardiography and the use of X rays are useful in differentiating cardiac and pulmonary disease. The author concludes that operative treatment to secure interruption of the thrombosed vein proximal to the source of embolism is always indicated, that conservative treatment, even if not followed by further embolism, is unlikely to prevent continuance of recurrence of the thrombosis—and that the use of heparin does not give protection against repeated embolism and a fatal outcome.

#### Tuberculosis Case Finding by General Hospitals.

WILLIAM G. CHILDRESS *et alii* (*The Journal of the American Medical Association*, August 14, 1943) advocate the routine X-ray or fluoroscopic chest examination of adults admitted to general hospitals. At Grasslands Hospital approximately 4% of patients who would not otherwise have been detected were shown to have evidence of tuberculous infection. Of these, 2.8% had reinfection disease, and 0.6% had active or questionably active disease requiring hospitalization or close observation. All those admitted to the chest services, and those with known or suspected pulmonary or heart disease who would have received an X-ray or fluoroscopic examination of the chest as a usual procedure, have been omitted from the study. The importance from a public health point of view of this group is emphasized, both in regard to the ease of transmitting the disease to others and for the better protection for the hospital worker.

#### Jaundice in Syphilitics under Treatment.

J. W. BIGGER (*The Lancet*, April 10, 1943) suggests that the increase in the incidence of jaundice in syphilitic patients undergoing arsenical treatment in recent years has been due to the transmission of a virus from patient to patient at clinics for the treatment of venereal disease. He shows that the technique for sterilizing syringes used at a certain large clinic for venereal diseases did not in fact disinfect them. Consequently if a virus was introduced into a syringe in the few drops of blood drawn up in proof of the entry of the needle into the vein, it might be passed into another patient. He advises the use of a freshly boiled syringe for each patient to prevent this from happening.

#### The Physiology of the Effort Syndrome.

M. S. JONES AND R. SCARISBRICK (*The Lancet*, September 11, 1943) have tested the physiological response to exercise in ten persons suffering from the effort syndrome and in sixteen controls. The subjects were put to work on a bicycle ergometer until they felt exhausted, whereupon samples of blood were withdrawn and analysed for oxygen capacity, oxygen and carbon dioxide content, hydrogen-ion concentration and lactic acid content. The subjects suffering from the effort syndrome did less work than the controls, but no evidence was found that they tended to develop respiratory alkalosis more

readily or that their arterial oxygen saturation was deficient either at rest or after exercise. The rise of lactate and fall of pH were considerably greater in the control group than in the patients, but the values obtained were in keeping with the amount of work done.

A. M. MASTER (quoted in an annotation in *The Lancet* of September 11, 1943) has obtained electrocardiograms after exercise from four persons suffering from the effort syndrome and has found changes which he interprets as indicating an inadequate blood supply to the heart muscle. He concludes that men of asthenic physique who have had symptoms of neurocirculatory asthenia possess a constitutionally small heart which does not eject enough blood per minute to nourish the heart, skeletal muscles and organs of the body adequately in response to effort.

#### Nicotinic Acid in Diabetes Mellitus.

F. J. NEUWAHL (*The Lancet*, September 18, 1943), in treating arterial disease of the heart and lower limbs with intravenous injections of 0.05% of nicotinic acid in saline solution, observed no reactions at first when a solution containing 5% or 10% of dextrose was used; but when the dextrose was omitted a violent and prolonged rigor occurred during and after the injections in all patients except those suffering from diabetes. It was found by experiment that nicotinic acid greatly depressed the blood sugar level. Further experiments suggested but did not prove that nicotinic acid might increase the action of insulin. In each of several diabetic patients it was found that the oral administration of nicotinic acid amide greatly improved the carbohydrate tolerance.

#### Achalasia of the Cardia.

A. H. DOUTHWAITE (*The Lancet*, September 18, 1943) states that the inhalation of amyl nitrite produces full relaxation of the cardia in cases of recent achalasia. The effect is short-lived, but inhalation over a period of several months possibly reduces the strength of the obstructive force. Nitroglycerin has a similar effect which is less complete but more prolonged. Amyl nitrite given from twice a day to once in two days abolishes symptoms in early cases. The heavy bougie also relieves symptoms often for a week after its passage. However, symptomatic benefit greatly exceeds radiological evidence of recovery whether nitrites or heavy bougie are employed. Discomfort arises from one to three days after the cardia has closed.

#### Proctoscopy in the Diagnosis of Amebiasis.

RAYMOND J. JACKSON AND WILFORD L. COOPER (*The American Journal of Digestive Diseases*, October, 1943) report the result of a study of 115 consecutive patients suffering from amebic dysentery with especial reference to the value of proctoscopy in the diagnosis of the condition. Ulceration of the lower part of the bowel, suggestive of amebiasis, as determined by proctoscopy, was found in 20.8% of the cases of amebic dysentery. Biopsy and scrapings from the ulcers at the time of proctoscopy made the diagnosis pos-

sible in two cases in which repeated examinations of stools had given negative results. In comparison with the other infectious types of diarrhoea, anal abscess and anal fistula were not common complications. The occasional coexistence of a carcinoma or other tumefactive lesion with amebic dysentery is sufficiently frequent to warrant proctoscopy in every case in which amebic dysentery is suspected.

#### Cardiac Arrhythmias following Pneumonectomy.

C. CABELL BAILEY AND REEVE H. BETTS (*The New England Journal of Medicine*, August 26, 1943) have reviewed the case histories of 78 patients upon whom total pneumonectomy had been performed and in whom there was no evidence of heart disease. They found that functional cardiac arrhythmias, especially auricular fibrillation and auricular flutter, occurred after operation in eight patients of the series. In their opinion, these arrhythmias alone do not indicate heart disease in such circumstances. They advise the restoration of the heart to normal rhythm as soon as practicable, either by rapid digitalization, or in selected cases by quinidine sulphate, in view of the possibility of the development of heart failure if the excessively rapid cardiac rate continues over many days. The authors state that the aetiology of these arrhythmias is unknown, and the hypothesis is suggested that the precipitating factor is vagal irritation from a stitch abscess, or infection of the bronchial stump in the presence of hyperexcitability of the auricular muscle resulting from displacement of the mediastinum.

#### Sulphadiazine Prophylaxis in an Epidemic of Scarlet Fever.

ROBERT F. WATSON, FRANCIS F. SCHWENTKEH, J. E. FETHERSTON AND SIDNEY ROTHBARD (*The Journal of the American Medical Association*, July 10, 1943) report the results obtained from an attempt to determine the value of sulphadiazine prophylaxis in an epidemic of scarlet fever; the infecting organism was Group A Type 19 haemolytic streptococcus, and sulphadiazine in two daily doses of 0.5 gramme effectively controlled the epidemic. Several thousand men were treated, and only three showed rashes due to the drug, whilst no major toxic reactions were observed.

#### Chemical Tests for Alcoholic Intoxication.

LESTER D. ELLERBROOK AND CHESTER B. VAN GAASBEEK (*The Journal of the American Medical Association*, August 7, 1943) stress the selection of proper material to be used, not only for correct diagnosis of alcoholic intoxication, but also for the provision of objective evidence for use in court. The relationship between the concentration of alcohol in the urine and the concentration in the blood may vary widely and the blood alcohol content cannot be calculated from that of urine. However, the existence of a practically constant ratio between the alcohol concentration of the blood in a superficial vein and that of the brain is indicated by evidence from the literature.



## Naval, Military and Air Force.

### CLINICAL MEETING AT AN AUSTRALIAN GENERAL HOSPITAL.

A CLINICAL MEETING was held at an Australian general hospital on December 19, 1943. COLONEL KIRKWOOD, the Commanding Officer, presided and welcomed guests of the allied forces and local medical practitioners.

#### Optic Atrophy.

LIEUTENANT-COLONEL DOUGLAS MILLER showed three patients exhibiting optic atrophy from causes of surgical interest. The first was a recent battle casualty whose left optic nerve had been divided by a bullet.

The second patient exhibited optic atrophy associated with a chromophobe adenoma of the pituitary. This soldier had slowly become completely blind in the left eye before reporting for medical attention, and even then had noticed no change in the vision of his right eye. On admission to hospital, he was found to have a temporal hemianopia of the right eye and no vision at all in his left eye. X-ray examination revealed the characteristic picture of ballooning of the *sella turcica* and erosion of the clinoid processes. He was operated upon soon after his admission to hospital (eighteen days prior to the clinical meeting) and a chromophobe adenoma of the pituitary gland was removed. Though no improvement had occurred in the vision of his left eye since operation, the field of vision of his right eye had come out well, and his visual acuity with that eye was now  $\frac{6}{60}$ .

The third patient exhibited secondary optic atrophy due to the presence of a large intracranial cyst. The soldier had been complaining of intense headache and of progressively failing sight for nine months. Soon after he began to have symptoms, an eye specialist had detected no abnormality on examination of his eyes. On his admission to hospital, the patient was found to be totally blind in the left eye, and he could just perceive his fingers with his right eye. Neurosurgical investigation disclosed very little in the way of localizing signs. The cerebro-spinal fluid pressure was found to be over 400 millimetres. X-ray examination revealed destruction of the clinoid processes secondary to the high intracranial pressure. A ventriculogram revealed a pronounced shift of the ventricles to the right, and during this investigation a large cyst in the left cerebral hemisphere was entered, and was found to contain about three hundred cubic centimetres of yellowish fluid, which did not clot on standing. At operation the cyst was found to be about two centimetres below the cortex and to have impinged on the lateral ventricle. A careful exploration failed to detect any mural nodule of a growth, and the cyst was then opened into the lateral ventricle, in order to provide drainage for it. The recovery from the operation was satisfactory, and the patient had had no symptoms for several months; but his vision had not returned and he was being educated as a blind man. Lieutenant-Colonel Miller said that a feature of this case was the extraordinary fact that a cyst of such a large size in the left hemisphere had caused no localizing signs.

#### Gunshot Wounds of the Head.

Lieutenant-Colonel Miller next showed two patients who had received gunshot wounds of the head; he contrasted a case in which retained intracranial metallic missiles of considerable size were causing no trouble, with a second case in which a tangential wound had resulted in the indriving of bone fragments into a hemisphere, and in which the patient was mentally dull and apathetic and had a persistent discharging sinus. In the second case the wound had been reopened and much bone and debris had been removed down to a depth of about four centimetres from the brain surface. In this case a considerable improvement in the soldier's general condition had occurred, as well as abolition of the discharging sinus.

Lieutenant-Colonel Miller said that these cases illustrated the opinion that indriven fragments of bone were much more mischievous than metallic fragments and were more prone to cause abscesses to form, or to maintain persistent sinuses. Metallic fragments were better left undisturbed.

#### Tidal Drainage of the Bladder.

Lieutenant-Colonel Miller finally showed a patient to illustrate the efficiency of the Munro tidal drainage apparatus as a means of caring for the paralysed bladder. The patient

had suffered a fracture of the upper dorsal portion of the spine, with paraplegia and bilateral wrist injuries, and later, as a complication, developed a massive collapse of the lung. He had been subjected to tidal drainage for eighteen weeks until an automatic bladder function was established, and during this time he had contracted no severe urinary infection. Lieutenant-Colonel Miller expressed the opinion that no other form of catheter drainage could have achieved this result. He said that tidal drainage could be applied only in the hospital where the complete treatment of the patient was to be undertaken, and that it was unsuitable for a patient who had to be moved from one unit to another. In those cases in which the injured man could be taken to the base hospital within forty-eight hours, suprapubic aspiration of the bladder was the safest treatment in the interim. Suprapubic cystostomy was indicated if a patient could not be expected to reach the base hospital within forty-eight hours. Repeated catheterization or drainage by an indwelling catheter should never be used.

#### Gas Gangrene.

MAJOR JOHN DEVINE showed a patient who had recently undergone amputation for gas gangrene infection of the leg. Two days before his admission to hospital the patient had fallen off the back of a slowly moving truck and had suffered a compound fracture of the tibia with dislocation of the ankle. His wound was excised and he was put in a complete plaster splint. Administration of sulphapyridine was started and continued throughout his period of treatment. The day after his admission to hospital he had swelling and blueness and inability to move his toes, and the plaster cast was split down in front. On his admission to hospital his pulse rate was 120 per minute and his temperature 101.8° F. The plaster splint was removed, and extension was applied to the leg by a pin through the *os calcis*. The leg below the knee was blue and covered by blood blisters; he could move his toes only slightly, and there was but a poor capillary return. The sutures were removed from his wound and some slight blood-stained serous discharge resulted. No gas could be palpated, and his general condition and colour were good. Next day his temperature was down to normal by evening, and his general condition continued to be satisfactory. However, thirty-six hours after his admission to hospital the foot looked much worse; the colour was again a deep blue, he had no capillary return and he could not move his toes. His temperature was again elevated, and his general condition, though still quite good, had deteriorated. No gas could be palpated in the tissues; he was not jaundiced, and there was no particular smell from his wound. Several hours later he looked much worse; he was noticeably jaundiced, and gas could be palpated in the tissues as high as the knee. His blood serum was noted to be bile stained when his blood was cross-typed. A blood transfusion was started, and an amputation in the mid-thigh was performed without a tourniquet and without preliminary ligation of the femoral artery, under cover of digital pressure on the femoral artery. Flaps were cut, and it was found that edematous yellow infected subcutaneous tissue extended up as far as six inches above the knee, and that infection in the muscle had extended highest in the sartorius, which was excised at a higher level. Silkworm gut sutures were put through the flaps without being tied, and wide open flaps were sprayed with sulphanilamide powder and covered by "Vaseline" gauze dressings. One day after operation the patient was still deeply jaundiced, and despite the transfusion of four pints of blood, hemoglobin estimations showed that hemolysis was still occurring. The day after operation his temperature rose to 101° F. and his pulse rate to 130 per minute. He would take only beer and ice-cream, which were given at frequent intervals. On the fourth day his wound was found to be quite clean, and after it had been irrigated with peroxide of hydrogen and sprayed with sulphanilamide powder, the previously inserted silkworm gut sutures were used to draw the flaps together lightly, anaesthesia being induced by "Pentothal" given to the "drunken" stage. Chemotherapy consisted of large doses of sulphapyridine started from the time of injury; this was changed to sulphathiazole when he developed signs and symptoms of pneumonia on the third post-operative day. He received in all 100,000 units of mixed gas-gangrene antiserum (mostly given into the transfusion tubing by means of a hypodermic needle). A direct smear from the wound revealed a Gram-positive sporing anaerobe. Several strains of anaerobes were isolated, and two strains of *Clostridium welchii* were found.

Major Devine said that the features of the cases were the following: (1) favourable soil—a very devitalized limb; (11)

speed of spread of infection—in a few hours; (iii) severe hæmolytic; deep jaundice occurred in a few hours, and hæmoglobin estimations showed that probably in all two grammes of hæmoglobin were hæmolyzed; the organisms produced a similar pronounced hæmolytic when grown *in vitro*; (iv) lack of the characteristic odour; (v) the fact that heavy chemotherapy by mouth from the time of injury did not prevent the onset of an acute gas-gangrene infection.

Major Devine then discussed modern views on gas-gangrene infection. He said that rational treatment was possible only if the methods of growth of the bacilli were studied. The organisms were all anaerobic; they could not live in the presence of oxygen. This salient fact made them difficult to grow both in the test tube and in the laboratory animal, unless certain precautions were taken. A study of the ways in which gas-gangrene organisms could be grown in laboratory conditions was instructive in its bearing on treatment. (i) They could be grown in closed jars, from which all the oxygen had been removed by chemical or electrical means. (ii) They could be grown in cooked meat media—in other words, in dead muscle. (iii) In many guinea-pig inoculation experiments in which it was necessary to be able constantly to reproduce the disease in order to evaluate the method of treatment, it was a standard procedure to introduce into an incision a culture of the organisms, together with some dead muscle and a little sterile soil, and then to close the wound. (iv) In culture media other aerobic bacteria might be employed to use up the oxygen, so that the anaerobic gas-gangrene organisms could live in an atmosphere free from oxygen. All these organisms produced a fluid and gas which separated the muscle fibres ahead of the infection, thus interfering with the blood supply of the muscle; the organisms thus prepared their own favourable soil ahead of themselves.

Major Devine went on to say that the mode of infection was usually thought to be from mud and infected, heavily manured soil, such as was found in France in the Great War; but recently it had been shown that woollen clothes often contained gas-forming organisms, whereas cotton clothes were usually free from them. Infection also could come from underclothes, particularly in wounds of the buttock. "Infestation" of a wound with gas-forming organisms was often found, particularly in chronic wounds in general hospital wards, but associated with no clinical symptoms. Epifascial, subcutaneous or gas abscess types of infection were not so serious as the varieties which spread through muscle.

Major Devine then summarized the clinical features. He said that the local signs were, first, the presence of a swollen, bluish and cool infected area, which was often covered with large blebs, particularly if it was in the lower limb. Later, crepitus, which was not a reliable sign, might be noticed, and perhaps a characteristic odour. X-ray examination might reveal typical longitudinal separation of muscle fibres by gas; but in many recent fractures imprisoned gas was present in the neighbourhood of the fracture, but did not indicate gas infection. Referring to the general signs, Major Devine said that a rising pulse rate, a low pyrexia (often an absence of pyrexia), cessation of pain, mental clarity, and later vomiting and even jaundice, were often found. At operation the infected muscle was dark in colour, did not contract and did not bleed.

With regard to treatment, Major Devine said that the matter was still hotly debated, but from experience and a survey of the recent literature it was possible to summarize the essentials. Prophylactic treatment consisted of the avoidance of primary suture of suspected wounds. Of eleven patients with proved gas-gangrene infection admitted to a Hawaiian general hospital after the Pearl Harbour attack, all had had primary suture. It was also reported that during the Great War, in 1915, when facilities for excision of wounds were not fully developed, gas-gangrene infection occurred in over 10% of wounds, compared with 1% in 1918. The local introduction of sulphonamides or zinc peroxide into the wound, and possibly anti-gas-gangrene antiserum given intravenously, were also indicated. In future most hope seemed to rest in the use of toxoids for active immunization. With regard to active treatment, Major Devine said that the type of surgical procedures depended as much on the blood supply of the affected part as on the infection. Infection in a poorly vascularized part nearly always made amputation necessary. On the other hand, epifascial infection might be treated by incisions, and infections of certain muscle groups might be treated by excision of the infected group alone. In all active surgical treatment of gas-gangrene infection the principles found by experimental investigation, whereby the organisms could not be grown in the presence of air and were helped to grow by soil and

dead muscle, must be borne in mind. Thus after amputation flaps were left open and dusted with either sulphonamides or zinc peroxide. Referring to serum, Major Devine said that it could only reach the threatened parts ahead of the infection, and because of the poorness of blood supply it could not effectively reach the site of infection itself. Doses of 10,000 units at least were needed; they were most conveniently given intravenously. The effectiveness of serum in human beings was doubted, though it was undoubtedly useful in the smallest of laboratory animals; but it was still given as a routine treatment. Referring to chemotherapy, Major Devine said that it was undoubtedly of use prophylactically, particularly if applied locally, and in active treatment it would at least help to control secondary infection. It was very doubtful whether radiotherapy was of much use; but in two of his own cases Major Devine had thought it was effective, though from other series of cases and experimental observations no definite beneficial results were reported.

Major Devine finally said that a study of figures from certain hospitals seemed to suggest that the mortality rate in fully developed cases of gas gangrene was not decreasing, despite the increased number of methods of treatment being used; it was approximately 33%. Surgery was still the most important point in treatment, both prophylactic and active.

#### Slow Healing of a Foot Infection.

Major Devine next showed a patient to illustrate how pathological overaction of the local vasodilator mechanism could prevent healing of a foot infection. Six months earlier this patient had had the left great toenail removed for an infected ingrowing toenail. Discharge from the wound persisted, and five months prior to the meeting X-ray examination revealed osteomyelitis of the terminal phalanx. A plaster splint was then applied. Four months prior to the meeting the terminal phalanx was laid bare by infection, and X-ray examination then revealed a periosteal reaction with osteoporosis. Aerobic culture produced a growth of Gram-positive streptococci, and anaerobic culture produced streptococci and Gram-positive bacilli. Three months prior to the meeting the patient was considered to be suffering from a symbiotic gangrene infection; he was treated by hydrogen peroxide baths, sulphathiazole and zinc peroxide applied locally. However, after some weeks no improvement had occurred, and a circular amputation was performed through the metatarsophalangeal joint. He was free from pain for six weeks, and the wound appeared healthy. Two months prior to the meeting culture produced a growth of Gram-positive cocci and hæmolytic staphylococci, but no anaerobes; the patient commenced once more to have severe pain, which was relieved only by hanging his foot down over the side of the bed. Two weeks prior to the meeting he had severe pain, and there was very little discharge from the indolent amputation wound; the whole foot was oedematous and cold and the capillary return poor, and X-ray examination revealed typical evidence of active vasodilatation throughout the whole foot (spotty absorption of bone at all the metaphyses). It was then considered that the problem of infection was secondary to the problem of circulation. Treatment was then begun with circulatory exercises, elevation of the leg, intermittent venous occlusion, intermittent application of ice packs to the foot, and movements both active and forced by faradic stimulation. The oedema disappeared, and the wound started to discharge profusely; sloughs separated, the pain disappeared and the patient no longer required morphine. Epithelium had begun to grow in from the edges.

Major Devine said that the features of this case were a pathological overaction of the normal vasodilator reflex response in the neighbourhood of trauma or infection (Sudeck's post-traumatic dystrophy) which had responded to circulatory exercises and procedures designed to produce alternate vasodilatation and vasoconstriction.

#### Reconstruction of a Buttock.

Major Devine then showed a patient illustrating the end-result of reconstruction of a buttock. Nine months ago a gunshot wound of both buttocks had exposed the rectum, and a compound fracture of the pelvis had been sustained. The wound was excised and a left inguinal colostomy was established at the time of wounding; this resulted in a large adherent scar over the left buttock. The scar angulated the anal canal, so that whenever the patient's bowels opened the scar broke down. In addition an osteomyelitic infection of the ischium developed and discharged for seven months from the pararectal wound. Three months prior to the

meeting the discharging sinus from the osteomyelitis of the ischium finally healed, leaving an adherent, non-stable scar which made sitting down very difficult and interfered with defecation. Because of its attachment to the anal canal (which was pulled upwards), the scar broke down whenever the bowels opened. Two months prior to the meeting the scar was completely excised, and with flap rearrangement and undercutting to bring the flap over the denuded areas the buttock was reconstructed, a few deep catgut sutures and silk for the skin being used. At the time of the meeting the patient had a stable, non-adherent scar which allowed him full function of the bowels, he had no trouble in walking or sitting down, and defecation was normal; in other words, he had "a functional buttock". His colostomy spur was crushed and had since been closed.

#### Hydatid Cysts in the Chest Wall.

Major Devine then showed his last patient, to illustrate hydatid cysts in the chest wall. The patient had been admitted to hospital one month previously with no symptoms whatever; he was a perfectly healthy and bronzed physical specimen. He had lived at Yass. Two opacities in the lung had been discovered at routine chest X-ray examination on his admission to the army, and confirmed as hydatid cysts by a strongly positive reaction to the Casani test. There was also some swelling of the chest wall posteriorly over the third left rib. Two operations were performed, separated in time by two weeks. At the first operation the upper hydatid cyst was approached under intratracheal anaesthesia, and was found to have involved a large part of the posterior portion of the fourth rib, four inches of which were removed. The hydatid cyst was found to be in the pleural cavity; it was completely shut off and somewhat lobulated, and contained many daughter cysts. Much lining membrane (endocyst) was removed, and a thick, fibrous ectocyst remained. Convalescence was uneventful. The second operation was also performed under intratracheal anaesthesia. The seventh rib in the posterior axillary line was exposed, and a few inches were removed. A thick-walled, partly loculated cyst full of caseous material was exposed, and the lining membrane and material were scooped out. No daughter cysts were seen. No hydatid fluid was found. The cavity was swabbed out with eusol, and convalescence was uneventful. The features of the case were that hydatid cysts of a rib apparently had secondarily infected the pleural cavity, and had caused a lower intrapleural extrapulmonary cyst probably by intrapleural drop extension. There had been no symptoms, but the lesions were discovered by routine chest X-ray examination on the patient's admission to the army.

#### Mastitis.

CAPTAIN J. DOWLING showed a patient suffering from bilateral mastitis of unknown aetiology. A soldier, aged forty-two years, in February, 1943, noticed a small lump above his left nipple. This suppurated and was incised. Twice in March and twice in April it recurred and was again incised. On his admission to hospital in July he had an indurated, deeply attached mass in the left breast, in which multiple scars and a small sinus were apparent. All investigations gave negative results, and cultural investigation produced a growth of non-specific organisms. In August a swelling appeared in the right breast and gradually increased in size. In September the seventh bilateral incision was made. The left breast contained no normal tissue and was attached firmly to the *pectoralis major* muscle, part of which was removed at operation. Multiple cysts surrounding "Vaseline" were also present. The right breast contained a nodular area, measuring two inches by one inch, of firm consistency, and confined within normal breast tissue. Examination of sections of the specimens revealed plentiful fibrous tissue with polymorphonuclear lymphocytic cell infiltration. Giant cells and pigment-laden histiocytes were present in the left breast, and no sign of malignant disease or of diseased bone was found at the operations. The wounds healed by first intention, and the patient was discharged to a convalescent depot. Five days later he was readmitted to hospital with a painful, woody, cellulitic swelling in the right breast. Some pus was obtained by incision three days later; but the cellulitic mass resolved slowly, and pus was draining still on December 6, 1943, when further incision created better drainage and brought about rapid healing. Meanwhile similar cellulitic masses developed in the left breast on November 15 and December 15, 1943. The former was incised and healed rapidly. On the latter occasion two separate cavities were opened, each containing a small

amount of foul pus. A discharge was still coming from the left breast on December 19, 1943.

Captain Dowling commented that the condition was apparently a non-specific chronic infection of the breasts. There was no underlying bone or lung disease. No specific organisms or streptothrix had been found. Malignant disease was not present. The Kline test failed to produce a reaction. He had been treated by excision and incisions when necessary, and had had courses of sulphathiazole therapy.

#### Nerve Injury due to Gunshot Wounds.

Captain Dowling then showed four patients suffering from peripheral nerve injury due to gunshot wounds. The first patient had a typical ulnar nerve palsy, the second a typical femoral nerve palsy, the third a typical common peroneal nerve palsy, and the fourth a complete paresis of the ulnar, median and medial cutaneous nerves of the forearm, and a partial radial nerve lesion.

(To be continued.)

#### APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 48, of March 9, 1944.

#### PERMANENT NAVAL FORCES OF THE COMMONWEALTH (SEA-GOING FORCES).

**Extension of Appointment.**—The appointment of Surgeon Captain William James Carr, C.B.E., is extended for a further period of one year from 30th January, 1944, under the provisions of National Security (Naval Forces) Regulations.

**Ante-dating Seniority.**—The seniority of Temporary Surgeon Lieutenant (D) Frank Rowland Johnson is ante-dated to 23rd May, 1942.

#### ROYAL AUSTRALIAN AIR FORCE.

##### Citizen Air Force: Medical Branch.

Temporary Squadron Leader A. S. De B. Cocks (281255) is promoted to the temporary rank of Wing Commander with effect from 1st December, 1943.

The following Flight Lieutenants are promoted to the temporary rank of Squadron Leader with effect from 1st December, 1943: J. F. Frayne (281244), G. C. Wilson (251265), J. H. Bilton (261266), W. P. H. Dakin (261274), P. E. Breheny (251272), V. S. Howarth (261522), A. J. Harker (261287), H. Whitaker (251709), T. H. Donnelly (291605), K. H. Hill (251689), J. Isbister (261691), R. C. Gill (271482), R. G. Mackay (261769), D. P. Sapsford (271742), J. Catarinich (251887), C. H. Anderson (261975), H. W. R. Sharp (261892), J. L. Williams (261894), B. C. Pirie (262084), A. K. McIntyre (262064), S. MacK. Morson (262063), W. D. Cunningham (261896), G. Mackintosh (262616), F. W. Perrottet (262723), J. H. Coto (252749), J. Hall-Johnston (262741), G. C. Corliss (262866), T. W. Jenkins (252867), M. A. O'Halloran (262870), D. H. Le Messurier (282721), A. A. Murray (252893), G. Roberts (253189).

Flight Lieutenant G. C. Wilson (251265) is granted the acting rank of Squadron Leader whilst occupying a Squadron Leader post with effect from 16th October, 1943.—(Ex. Min. No. 63—Approved 8th March, 1944.)

The probationary appointment of Flight Lieutenant J. Segal (267406) is confirmed.

Temporary Squadron Leader V. E. Knight (251197) is granted the acting rank of Wing Commander whilst occupying a Wing Commander post with effect from 1st January, 1944.

The following Flight Lieutenants are granted the acting rank of Squadron Leader whilst occupying Squadron Leader posts with effect from the dates indicated: T. F. Ahern (263339), 15th November, 1943, R. C. Gill (271482), F. J. B. Drake (252835), S. D. Watsford (253263), 1st December, 1943.

##### Reserve: Medical Branch.

The following are appointed to commissions on probation with the rank of Flight Lieutenant with effect from the dates indicated: Nicholas Kerkenezov, M.B., B.S. (267618) (10th November, 1943), Robert Valentine Selwood, M.B., B.S. (297433), Eric James Reye, M.B., B.S. (277478) (13th December, 1943), Ernest William Bate, M.B., B.S. (257611), (10th January, 1944).—(Ex. min. No. 66—Approved 8th March, 1944.)



## Correspondence.

### A NOTE ON THE BLOOD SEDIMENTATION TEST.

SIR: The interesting phenomenon described by Dr. D. B. Rosenthal in his letter of February 26 was recognized many years ago on the Continent. I refer to the finding of a normal sedimentation in a cachectic dying patient. In an article, based on six years' experience of the test and which appeared in the *British Medical Journal* of March 12, 1932, I wrote: "In emaciated patients with very advanced disease, relatively low readings are almost invariable." My records are at the Montana Hall Sanatorium in Switzerland, but I recollect several such cases with rates within normal limits or only slightly increased.

In the paper referred to, I stated that the most likely explanation of slow rates in dying cachectic patients is "a diminution of the fibrinogen and a lowered concentration of the serum protein. Increase of fibrinogen and serum globulin in the blood plasma is probably the most important factor in the production of an increased rate".

The apparent paradox of a slow sedimentation in the cachectic stage of far advanced disease with hopeless prognosis, may be contrasted with the very high sedimentation rate in pleural effusions with excellent outlook. The seemingly "paradoxical" result, as it has been called in the Continental literature, and which Dr. Rosenthal describes, should be no more surprising than the behaviour of the temperature in the cachectic dying patient. Such vagaries do not diminish the usefulness of the thermometer during the earlier phases of the illness, and similarly the behaviour of the blood sedimentation rate in a terminal cachexia does not detract from the value of the test. This value, however, is obviously not absolute. The test must be interpreted with due regard to all other available data. Beaumont and Dodds in "Recent Advances in Medicine" state: "The sedimentation test is definitely established as a valuable indication of the progress of a case of pulmonary tuberculosis." My eighteen years' experience of it is confirmatory of this opinion. One important practical point, stressed in my paper, but often overlooked, is the necessity to carry out the test under standard conditions of temperature, preferably in a constant temperature chamber, at 65° F.

We should be grateful to Dr. Rosenthal for demonstrating in the journal the slow sedimentation rate of cachexia.

Yours, etc.,

HILARY ROCHE.

Austin Hospital for Cancer and Chronic Diseases,  
Heidelberg,  
Victoria.  
March 2, 1944.

### AN UNUSUAL PERFORATION OF THE BOWEL IN AN ELDERLY PATIENT.

SIR: The following case, I think, should prove interesting when considered with that of G. Winter Ashton (THE MEDICAL JOURNAL OF AUSTRALIA, February 14, 1944).

J.R., a farmer, aged seventy-five years, was admitted to this hospital at 2 a.m. on January 16, 1944, with this history: At 5 p.m. the previous evening he had strained himself opening a slip-rail, and, feeling his "rupture come down", had attempted to reduce it, using considerable force. He succeeded in the reduction, but was immediately seized with excruciating pain in the lower abdomen. In spite of the pain he rode home on horseback and then contacted his doctor, who made a "telephone diagnosis" of strangulated hernia, and arranged ambulance transport to hospital.

On admission to hospital the patient was obviously in intense pain, but although a right inguinal hernia was present there was no evidence of strangulation. However, the patient's abdomen showed a characteristic board-like rigidity with generalized tenderness. His temperature was 98° F. and his pulse rate 100 per minute.

A diagnosis of perforated duodenal ulcer was made and a laparotomy through a right paramedian incision was performed one hour after admission. The peritoneal cavity contained much partly digested food and also many passion-fruit and melon seeds. A careful search failed to reveal any perforation of the duodenum or stomach, but on delivering a loop of jejunum into the wound a perforation was found. This perforation was about one centimetre in length and in the long axis of the bowel, and was situated about five feet from the duodenum. This was oversewn with catgut

and the peritoneal cavity was cleared of as much debris as possible. A rubber tube drain was introduced into the pelvis through a suprapubic stab wound and the abdomen was closed.

On his return to the ward the patient was given continuous intravenous 5% dextrose saline alternating with normal saline. Also acetylcholine one cubic centimetre every six hours was given to guard against paralytic ileus.

The intravenous fluids were discontinued on the fifth day, after fifteen litres in all had been given, as the patient was then able to take copious fluids by mouth.

On the eighth day the centre of the wound broke down and discharged freely for a week before settling down, and on the tenth day an enterocolitis developed which responded well to sulphaguanidine.

Apart from these complications the convalescence was uneventful, and now, six weeks after his admission, the patient is fit and well and has been discharged from hospital.

This case is of clinical interest on account of the unusual site of the perforation and the probable agency of trauma (namely, forcible reduction of the hernia by the patient himself) in its causation, and because it demonstrates well the powers of the peritoneum, even in so old a patient, to deal with contamination, which in this particular case must have had an extremely irritant action.

In conclusion, I wish to thank Dr. N. St. C. Mulhearn for his permission to record this interesting case.

Yours, etc.,

HUBERT R. HARRIS, M.B., B.S.

Base Hospital,  
Grafton.

New South Wales.  
March 6, 1944.

### THE SIR JOHN RAMSAY MEMORIAL LIBRARY.

SIR: The committee of the Sir John Ramsay Memorial Library wish to thank very sincerely the undermentioned gentlemen for gifts to the library: Dr. A. E. Butler, Canberra, three volumes of the "Medical History of the War" (autographed); Dr. H. Grover, Port Melbourne, a run of "Medical Annals"; Dr. Henry Seeley, 55, Collins Street, Melbourne, books of general interest, including volumes of *The British Journal of Surgery* and of the "Mayo Clinic"; Dr. W. J. Craig, Box Hill, Melbourne, books of general interest, including Henoch's "Diseases of Children".

It is books of the above type, that is to say, text-books which have become classical, and runs of journals that we are so anxious to get. Since the first appeal was made Sir John Ramsay has died. During the last few months of his life it was his great wish to see the library firmly established. With the help of such well-wishers as those mentioned above, we sincerely hope that this wish will be fulfilled.

Yours, etc.,

C. CRAIG,  
Surgeon Superintendent, General  
Hospital, Launceston.

March 6, 1944.

## Medical Prizes.

### THE STAWELL PRIZE.

THE Stawell Prize, a memorial to Sir Richard Stawell, is open for competition. The amount of the prize is £30. The conditions are as follows:

1. The prize shall be awarded to the writer of the essay adjudged to be the best on a subject selected annually.
2. The subject for 1944 is "The Influence of Diet in Health and Disease".
3. The dissertation should be based on personal observation and experience of the writer.
4. The competition is open to graduates of any Australian university.
5. The trustees reserve the right to withhold the award.
6. Essays must be delivered to the Medical Secretary, British Medical Association (Victorian Branch), by 4 p.m. on November 30, 1944.
7. Each essay must be typewritten or printed and must not exceed 75,000 words in length.
8. Each essay must be distinguished by a motto and must be accompanied by a sealed envelope marked by the same motto, containing the name and address of the author.
9. The trustees reserve the right to publish the prize essay.

## Nominations and Elections.

The undermentioned have applied for election as members of the South Australian Branch of the British Medical Association:

- Aitken, Gilbert William Elliot, M.B., B.S., 1943 (Univ. Adelaide), Royal Adelaide Hospital.  
 Burnell, Arthur William, M.B., B.S., 1943 (Univ. Adelaide), Royal Adelaide Hospital.  
 Craven, David Edward, M.B., B.S., 1943 (Univ. Adelaide), Royal Adelaide Hospital.  
 Davies, David Llewelyn, M.B., B.S., 1943 (Univ. Adelaide), Royal Adelaide Hospital.  
 Jansen, Marcus Gordon, M.B., B.S., 1943 (Univ. Adelaide), Royal Adelaide Hospital.

The undermentioned have been elected as members of the South Australian Branch of the British Medical Association:

- Adey, William Ross, M.B., B.S., 1943 (Univ. Adelaide), Royal Adelaide Hospital.  
 Stace, John Hamilton, M.B., B.S., 1943 (Univ. Adelaide), Royal Adelaide Hospital.  
 Pavy, Ian Gordon, M.B., B.S., 1943 (Univ. Adelaide), Royal Adelaide Hospital.  
 Rolland, John Alexander Bryan, M.B., B.S., 1943 (Univ. Adelaide), Royal Adelaide Hospital.  
 Kelly, Thomas Davis, M.B., B.S., 1943 (Univ. Adelaide), 105, Prospect Road, Prospect.  
 Leslie, Peter William, M.B., B.S., 1943 (Univ. Adelaide), Royal Adelaide Hospital.  
 Russell, Robert Alfred, M.B., B.S., 1943 (Univ. Adelaide), Royal Adelaide Hospital.  
 Potter, Vernon Wheatley, M.B., B.S., 1941 (Univ. Adelaide), 30, Moseley Street, Glenelg, South Australia.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association:

- Arnheim, Robin Frederick Gordon, M.B., B.S., 1941 (Univ. Sydney), 1, Greengate Road, Killara.  
 Hall, George Vincent, M.B., B.S., 1939 (Univ. Sydney), NX113914, Captain G. V. Hall, 113th Australian General Hospital, Australia.  
 Harrison, Francis William, M.B., B.S., 1941 (Univ. Sydney), 62, Cumberland Street, Cessnock.  
 Lackey, Samuel, M.B., B.S., 1940 (Univ. Sydney), NX116628, 2/5 Australian Armoured Regiment, Australia.  
 Lipscomb, Bertram Mark, M.B., B.S., 1943 (Univ. Sydney), "Camberley", Edgecliff Square, Edgecliff.  
 Love, Colin James, M.B., B.S., 1943 (Univ. Sydney), 31, Coolong Road, Vaucluse.  
 McGlynn, Ronald William, M.B., B.S., 1943 (Univ. Sydney), Royal North Shore Hospital, St. Leonards.  
 Seamounts, Henry, M.B., B.S., 1943 (Univ. Sydney), Box 21, Queen Victoria Buildings Post Office, Sydney.  
 Taylor, John Russell Robert, M.B., B.S., 1939 (Univ. Melbourne), Regents Court, Springfield Avenue, Potts Point.  
 Wheeler, Llewellyn Daniel, M.B., B.S., 1943 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.  
 Whyte, George, M.B., B.S., 1943 (Univ. Sydney), District Hospital, Marrickville.  
 Yuille, Alexander Loddon, M.B., B.S., 1942 (Univ. Sydney), NX200880, Captain A. L. Yuille, H.Q.R.A.E., 6th Australian Division, Australia.  
 Deane-Butcher, James, M.B., B.S., 1939 (Univ. Sydney), 3, Bertha Road, Cremorne.

## Obituary.

HENRY MAUDSLEY.

We regret to announce the death of Sir Henry Maudsley, which occurred on March 5, 1944, at Melbourne.

## Books Received.

"Healthy Motherhood", published under the authority of the Hon. C. A. Kelly, M.L.A., Minister for Health; 1943. Sydney: New South Wales Department of Public Health, Division of Maternal and Baby Welfare, 52 Bridge Street. 9" x 6", pp. 40, with illustrations.

"Matilda Waltzes with the Tommies", by Mary Kent Hughes (T/Major Thornton, R.A.M.C.); 1943. Melbourne: Oxford University Press. 8½" x 5½", pp. 176, with many illustrations. Price: 7s. 6d.

"The Arthropathies: A Handbook of Roentgen Diagnosis", by Alfred A. de Lorimier, A.B., M.A., M.D.; 1943. Chicago: The Year Book Publishers, Incorporated. 8" x 5½", pp. 319, with many illustrations. Price: \$5.50, post paid.

## Diary for the Month.

- MAR. 22.—Victorian Branch, B.M.A.: Council Meeting.  
 MAR. 24.—Queensland Branch, B.M.A.: Council Meeting.  
 MAR. 28.—New South Wales Branch, B.M.A.: Council Quarterly.  
 MAR. 30.—New South Wales Branch, B.M.A.: Annual Meeting.  
 MAR. 31.—Queensland Branch, B.M.A.: Branch Meeting.  
 APR. 4.—New South Wales Branch, B.M.A.: Council Meeting.  
 APR. 5.—Victorian Branch, B.M.A.: Branch Meeting.  
 APR. 5.—Western Australian Branch, B.M.A.: Council Meeting.  
 APR. 11.—New South Wales Branch, B.M.A.: Executive and Finance Committee.  
 APR. 11.—New South Wales Branch, B.M.A.: Organization and Science Committee.  
 APR. 11.—Tasmanian Branch, B.M.A.: Branch Meeting.

## Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

**New South Wales Branch** (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Nurses' Association; Ashfield and District United Friendly Societies' Dispensary; Balmmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

**Victorian Branch** (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

**Queensland Branch** (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

**South Australian Branch** (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

**Western Australian Branch** (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia.

## Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such a notification is received within one month.

**SUBSCRIPTION RATES.**—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and book-sellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rates are £2 for Australia and £2 5s. abroad per annum payable in advance.

44.

ughes  
xford  
ations.

st", by  
: The  
with

rtterly.  
eeting.

eeting.

e and

n and

ntice.

or any  
licated  
r with  
iation,

quarie  
shfield  
almain  
t and  
Man-  
Oxford  
Dis-  
mpany

Hall,  
mitted;  
dential  
Mutual  
Club;  
ppoint-

s, 225,  
ociated  
federal  
s and  
NTRY  
sed, in  
reement

North  
South  
South

Saint  
ontract

cannot  
es for-  
o The  
ary be

r, The  
Seamer  
1-2.)  
anager,  
Glebe,  
in the  
pt any  
-receipt  
in one

rs not  
tue of  
eciation  
rnal by  
l book-  
of any  
are £2  
dvance.